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International Journal of Advanced Research in Medical, Nursing and Health Sciences (IJARMNHS) aims to promote excellence in medical and nursing research, and healthcare with a vision to advance knowledge for practice, education, research and administration in healthcare.

The journal intends to disseminate high quality research reviews, clinical and contemporary healthcare issues-based articles for the advancement of evidence based healthcare. The target audience for the journal includes medical and para - medical professionals in all domains and at all hierarchical levels, who are committed to advance practice and professional development on the basis of new knowledge and evidence.

The journal is peer reviewed and published bi-annually. The journal publishes articles related to healthcare of individuals, families and/or community to help them attain or recover health and improve quality of life. Quality articles in the field of education, administration, teaching and learning, are considered for publication.

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EDITORIAL

Dear Readers,

I am truly honoured to have been appointed as the head editor of the esteemed International Journal of Advanced Research in Medical, Nursing, and Health Sciences (IJARMNHS). Its purpose is to report on the most recent developments in the health care industry while also reflecting on and guiding future theoretical and clinical research. I intend to increase the journal's renown to the best of my ability.

Scientific articles, healthcare facility innovations, nursing education and administration, and other related topics may find a suitable home in our publication. The goal of our publication is to provide a platform for the dissemination of theoretical and practical knowledge as well as the investigation of potential future trends and applications.

Professionals will highly praise IJARMNHS. There have been eleven published articles that were shortlisted and include a range of topics related to nursing sciences, pharmaceutical sciences, and physiotherapy. To the distinguished individuals, writers, editors, reviewers, and everyone else who helped make Volume-3, Issue-1 (January–June–2025) a smashing success, I am eternally grateful.

- Editor–in–Chief

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ASSESS THE KNOWLEDGE REGARDING FIRST AID MANAGEMENT FOR CHILDREN AMONG SCHOOL TEACHERS

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Abstract:

Background: Knowledge of first aid, which constitutes lifesaving treatment for injuries or unexpected illness, is important for every individual, especially children. A teacher is the key person who can attend to the children's minor injuries in the school. Having a basic knowledge of first aid management may help school children from serious issues. There are many measures teachers can take to reduce the risks, like wounds, nosebleeds, bee stings, bites, and others. The children are our nation's most precious resource. It is the responsibility of the teacher to safeguard children, hence the present study aims to assess the knowledge regarding first aid management among schools. This study is a Non-experimental descriptive study; a non-probability convenience sampling technique was used. The data were collected by using a self-administered questionnaire to 67 primary and middle school teachers. Results of this study revealed that, among 67 school teachers, 7.5% had inadequate knowledge, 73.1% had moderate knowledge, and 19.4% had adequate knowledge. There is a significant association between background variables such as age, gender, educational status, and monthly income. This study reveals that having a significant level of knowledge of school teachers regarding first aid management for children.

Key Words: Assess, Knowledge, First-Aid Management, Children, School Teachers

Introduction:

Children injuries are growing as a global public health problem. Thousands of children die each year from injuries or violence, and millions suffer the consequences of nonfatal injuries. Especially in schools they are exposed to various types of minor injuries like sports injury, bleeding, fracture, wound etc. Accidents and injuries are major causes for disability and death among children. School age children are very active at home, community and the school. This increased activity and time away from parents, increases the risk for unintentional injuries.

They are at high risk of accidents that decreases their ability to attend school regularly. The death rate in children between 5 to 10 years of age is less than primary school children. [1]

One set of goals of first aid is called the three 'P's;- preserve life- stop the person from dying, prevent further injury- stop the person from being injured even more, if possible an injured person should not be moved and promote recovery- try to help the person heal their injuries. Each year, 20% to 25% of all children sustain an injury and need to seek medical attention or miss school. The future development of children depends on their enjoying good health today.[2] Globally, every year 1,50,000 people die in situations where first aid could have given them a chance to live. Even so, fewer than one in 10 people have been trained in first aid. Primary school teachers need to be equipped with first aid training.[3]

Every time a health worker might not be available in school, where accidents can take place at any time. It is required that the school staff should be aware that they can be responsible for looking after the minor injuries or accidents in the schools. Student safety is a major concern for parents and school staff. The first aider is also likely to be trained in dealing with injuries such as cuts, chocking, fracture, wound, and bleeding. They may be able to deal with the situation as a whole

Objectives of the study

- To assess the level of knowledge regarding the first-aid management among school teachers.
- To find out the association between knowledge scores of school teachers regarding first aid management with their selected background variables.

Methodology: This study used a quantitative, non-experimental descriptive design. This study was conducted with primary school teachers in the rural part of Andhra Pradesh. The samples were primary school teachers with the criteria of who are willing to participate, working there for more than a year, and are available at the time of data collection. The samples were selected by a convenience sampling technique, a non-probability method. In total, 67 primary school teachers participated in this study.

Tools and techniques: The research tool was developed by the investigator with two sections. Section was about demographic variables, and section two about first aid management. Section 2 was prepared with 30 MCQ, a Self-administered questionnaire and the reliability of the scale was r = 0.95. Scoring and interpretation of the knowledge levels were as follows: below 40% is inadequate, 41 to 70% is moderate knowledge and more than 71% considered as adequate knowledge.

Results:

Data were analysed by using descriptive and inferential statistics. Below mentioned tables and figures depict the results of the study.

Table 1: Frequency and percentage distribution of background variables of school teachers.

n = 67

Background Variables.		Frequency	Percentage (%)
Age	25 - 30 Years	14	20.9
	31 - 35 Years	11	16.4
	36 - 40 Years	17	25.4
	> 41 Years	25	37.3
Gender	Male	40	59.7
	Female	27	40.3
Religion	Hindu	61	91.0
	Muslim	5	7.5
	Christian	1	1.5
	Others	0	.0
Marital Status	Married	58	86.6
	Unmarried	9	13.4

In the samples of 67 regarding age 25 (37.3%) were above 41 years. Regarding gender 49(59.70%) were males and 27(40.3%) were females. Regarding religion majority were Hindus 61(91%). Regarding marital status 58(86.6%) were married, 9(13.4%) were unmarried.

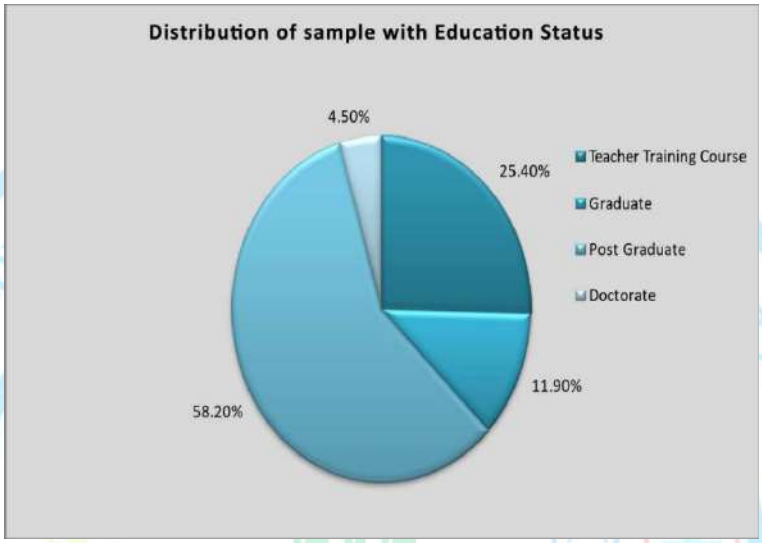

Figure 1: Percentage Distribution According To Education Status.

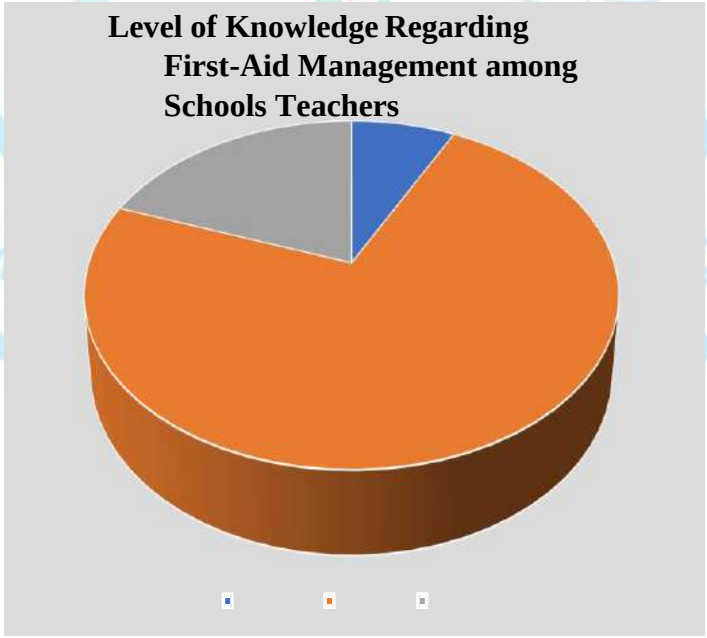

Figure 2: Percentage Disturbution Of Knowledge Scores On First Aid Management.

Table 3: Item wise analysis of knowledge on first aid management

S.no	Item	No of questions	Maximum scored	Response average
1.	First- Aid	3	3	47.46
2. .	Bleeding	8	8	44.2
3. .	Foreign bodies	4	4	44.2
4. .	Fractures	5	5	68.66
5. .	Fainting, shock, andheat	4	4	50.2
6.	Seizures	4	4	42.17
7. .	Bee sting	2	2	57.45

The above table 3 shows that out of 67 samples the average response for first aid was 47.46, for bleeding 44.2, for foreign bodies 44.2, for fractures 68.66, for fainting, shock and heat stroke 50.2, for seizures 42.17 and for bee sting it was 57.45 respectively.

Table 4: Association of demographic Variables with Level of Knowledge

Background variables	Chi-square P-value	Df	P-value at 0.05
Age	$\chi 2 = 14.032$*	6	0.029 (S)
Gender	$\chi 2 = 10.856$*	2	0.004 (S)
Education Status	$\chi 2 = 16.970$*	6	0.009 (S)
Monthly Income	$\chi 2 = 16.915$*	6	0.009 (S)

The above table shows that age, gender, educational status, and monthly income are associated with the level of knowledge regarding first aid management among school teachers.

Conclusions: The major findings of the study were that 73.1% had moderate knowledge, which shows that the implementation of the training program will fully equip the school teachers to manage the first aid needs of the school children before the health team arrives.

Recommendations: This study recommends conducting further research like an experimental study, with the counselling program based on first aid measures and a comparative study can be done to assess the knowledge between rural and urban school teachers.

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"Effectiveness of Structured Educational Intervention on Knowledge Regarding Text Neck Syndrome Among Nursing Students"

Devi NP, Patel P, Samal P, Paul N, Samantray P, Naik PP, Sen PP, Samal R, Parween R, Pradhan OP, Sahoo SK.

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Abstract:

Introduction: In the digital era, excessive use of mobile devices has led to various musculoskeletal disorders, one of which is Text Neck Syndrome. This condition is caused by prolonged forward head posture while using smartphones, leading to neck pain, stiffness, and other complications. Objective:1.To assess the knowledge and implement a Structured educational Intervention regarding text neck syndrome among the students. 2. To evaluate the effectiveness of a Structured educational Intervention on text neck syndrome among nursing students. 3. To determine the relationship between post-test knowledge scores on text neck syndrome and the selected variables. The study employed a pre-experimental design, utilizing a one-group pre-test and post-test approach. 30 nursing students were selected for this study using a convenience sampling technique. The study employed a structured knowledge questionnaire on text neck syndrome to collect data from study participants, and the tool was validated by five subject experts. Descriptive and inferential statistical techniques were applied to analyse the gathered data. Results: According to the study's findings, 83.3% had poor knowledge, 16.6% had average knowledge, and 0% had good knowledge regarding text neck syndrome. The mean test scores and SD in the pre-test on knowledge regarding the Text Neck Syndrome were 9.50 and 2.52, respectively, and increased in the post-test mean score and SD, being 17.7 and 3.21, respectively. As the t-test value is (t = -17.654, p=0.00), and the p-value is 0.00, which is less than the conventional 5% level of significance, this means the knowledge of participants has significantly changed. Discussion: This study makes a valuable contribution by highlighting and addressing the existing gap in health awareness regarding Text Neck Syndrome (TNS) among nursing students. Implementing structured educational programs in schools and colleges can help minimize the risk of developing TNS. Conclusion: The study concludes that post-test knowledge scores showed no significant association with demographic

variables, except for the father's occupation. It also demonstrates that a structured education intervention was effective in improving students' knowledge of text neck syndrome.

Keywords: Text neck syndrome, smartphone, musculoskeletal disorder

Introduction:

Cell phones have become an essential part of modern life, used not only for communication but also for internet access and messaging. However, prolonged use often leads to "text neck syndrome," a condition caused by repeatedly bending the neck while using devices. This issue is increasingly common among youth.

Sustained forward head posture can cause changes in the cervical spine, ligament strain, intervertebral disc degeneration, and even reduced lung capacity. Children are particularly vulnerable due to their body proportions. Globally, musculoskeletal disorders are a major health burden, with neck pain being a leading cause of disability among adolescents.

Despite its growing prevalence, text neck syndrome is rarely addressed in nursing education. Early educational interventions for nursing students can help prevent long-term complications such as chronic pain, reduced productivity, absenteeism, and early career termination.

The study was undertaken in response to increased smartphone use among college students, which places them at higher risk of developing text neck syndrome.

Methodology

The study design that played out in conducting this research was pre-experimental pre-test post-test design because it targeted to examine the efficacy of STP on text neck syndrome. A total of 30 students of nursing School of nursing, Cuttack, were used as the sample. The sampling method used was the convenient sampling method. The use of self-administered structured questionnaire was used to determine knowledge. The descriptive and inferential statistics analysed the data collected.

Results:

The most respondents that is 20 students (66.6% of the total), we're aged 19-20 years. Meanwhile 10 respondents (33.3%) we're in the age range of 17-18. Gender has the frequency of 24 (80%) were female and 6 (20%) were male. Education of the father of the respondents are majorly 17(56.6%) were graduate, minorly it was same frequency 3(10%) of both primary

education and lost graduation and moderately it was 7(23.3%) were completed higher secondary education. The education of mother of the respondents are majorly 13(43.3%) were completed their higher secondary education, minorly it was 1(3.3%) were post-graduate and others are 7(23.3%) were only completed primary education and 9(30%) were graduate. Most of the respondents, 18 individuals (60%) were from nuclear family, meanwhile 12 individuals (40%) were from joint family. The occupation of the father of the respondents are majorly 9(30%) were farmer, 5(16.6%) were government employees and others have the fame frequency of 8(26.6%) were business man and private employees. Occupation of mother of the respondents are majorly 23(76.6%) were housewives, minorly 2(6.6%) were government employees and moderately it was 4(16.6%) were private employees. Annual income of the family of the respondents have major frequency 19(63%) had the income of <1 lakh, minor frequency is 3(10%) had the income of >2 lakh and moderate frequency is 8(26.6%) had the income between 1 lakh - 2 lakh. Area of residence of the respondents have the frequency of 17(60%) were from urban area and 12(40%) were from rural area. Number of siblings of the respondents have the major frequency of 15(50%) has siblings, minor frequency of 0(0%) had >2 siblings and others are 12(40%) had 1 sibling and 3(10%) had zero siblings.

Table 1: The efficacy of the structured educational intervention is evaluated through the comparison of knowledge levels on the Text Neck Syndrome on the pre-test and post-test.

Score	Mean	SD	Mean Difference	df	Paired T test	P value
Pre-test	9.53	2.52	8.37	29	-17.654	0
Post-test	17.9	3.21				

The above table No. 1 revealed the comparison of the knowledge scores on text neck syndrome before and after a Structured Educational intervention in GNM Nursing students. As the t-test value is (t = -17.654, p=0.00), and p-value is 0.00 which is less than the conventional 5% level of significance, this means the knowledge of participants has significantly changed. The mean test scores in pre-test on knowledge regarding the Text Neck Syndrome were 9.50 (38%), which

has increased in post-test mean score 17.7 (70.8%). Therefore, the knowledge on Text Neck Syndrome has significantly increased post-intervention among GNM students.

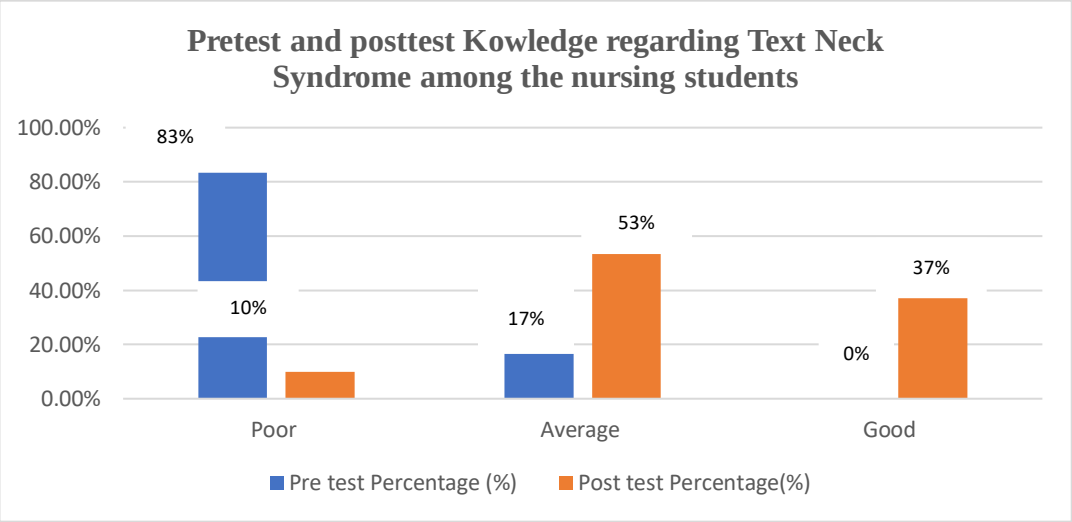

Figure 1. shows the knowledge score of Pre-test and post-test knowledge regarding text neck syndrome among nursing students.

Table 2: Association between Level of Knowledge and Socio- demographic Variables.

N=30

Sl no.	Demographic Variable	Categories	Test Score			X2	P-Value	Level of significance
			Poor	Average	Good			
1.	Age (years)	17 – 18	0	7	3	2.463068 df=2	.2918	NS
		19 - 20	3	9	8			
2.	Gender	Male	1	4	1	1.401515 df=2	.4962	NS
		Female	2	12	10			
3.	Education	GNM 1st yr	2	9	4	1.40151	.4962	NS

		GNM 2nd yr	1	7	7	5 df=2		
4.	Occupation of Father	Business an	0	2	6	22.73864 df=6	.0008	S
		Private Employee	0	6	2			
		Farmer	0	6	3			
		Govt. Employee	3	2	0			
5.	Occupation of mother	Housewife	2	10	10	3.608815 Df=4	.4615	NS
		Govt. Employee	0	2	0			
		Private Employee	1	4	1			
6.	Type of family	Nuclear	3	11	4	5.071023 df=2	.07922	NS
		Joint	0	5	7			
7.	Area of residence	Rural	0	9	3			NS
		Urban	3	7	8	4.502841 df=2		
8.	Father's education	Primary education	0	3	0	5.385791 df=6	.1052	NS
		Higher secondary education	0	4	3			
		Graduates	3	7	7			
		Postgraduate	0	2	1			

9.	Mother's education	Primary education	0	5	3	2.690183 df=6	.8466	NS
		Higher secondary education	2	6	4			
		Graduates	1	4	4			
		Postgraduate	0	1	0			
10.	Number of siblings	No sibling	0	1	2	2.508523 df=4	.6431	NS
		One sibling	2	7	3			
		Two Siblings	1	8	6			
		More than two siblings	0	0	0			
12.	Annual income of the family	< 1lakh	3	11	5	3.732057 df=4	.4434	NS
		1lakh-2lakhs	0	4	4			
		>2lakhs	0	1	2			

The table no. 2 above demonstrates that there is no statistical significance of the post -test level of knowledge on text neck syndrome in relation to the choice of sociodemographic variables Age, gender, education, area of residence, father and mothers education, type of family, annual family income occupation of mother and number of siblings, but that there is association of knowledge of text neck syndrome with occupation of father.

Discussion

The pre-test results of the present study showed that most students (83.3%) had poor

knowledge of Text Neck Syndrome, while 16.6% demonstrated an average level of knowledge and none had adequate knowledge. In contrast, the post-test findings indicated noticeable improvement: 53.3% of students attained average knowledge, 36.6% achieved good knowledge, and only 10% remained in the poor knowledge category. This marked increase in knowledge levels following the structured teaching programme highlights the effectiveness of educational interventions in improving students' understanding of Text Neck Syndrome.

A comparable study by Avnee Naik, Sucheta Yangad et al. (2023) reported that the mean knowledge score increased from 0.8 in the pre-test to 7.16 in the post-test. The calculated *t*-value was 37.9 with 99 degrees of freedom. These findings revealed that a statistically significant improvement in nursing students' knowledge regarding Text Neck Syndrome following the planned educational intervention programme.[5]

The correlation study comparing the between the knowledge of Text Neck Syndrome and the chosen demographics variables in the current study did not have any statistically significant result between the posttest scores of knowledge and the majority of sociodemographic variables such as age, gender, education, parents educational status, area of residence, type of family, annual family income, mothers occupation, number of siblings. Nevertheless, there was a notable correlation between understanding of Text Neck Syndrome and the father occupation.

A similar case study by Latha P., Karthi R., A. According to Anbarasu et al. (2020), the levels posttest knowledge on Text Neck Syndrome were significant with selected sociodemographic variables including age, gender, mothers education, parents occupations, place of residence, daily duration of mobile phone use and years of mobile phone usage at p 0.05. There was however, no significant value regarding the level of post-test knowledge to be related to the fathers education and monthly income of the family.[6]

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Nurse Burnout: Impact On Health And Job Satisfaction Of Nurses

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Abstract:

Nurse burnout is a growing global issue that significantly affects both the well-being of nurses and the quality of patient care. Burnout is characterized by emotional exhaustion, depersonalization, and a reduced sense of professional accomplishment. High workloads, emotional demands, inadequate staffing, and unsupportive organizational environments are major contributors. Burnout is especially common in high-intensity units and has increased notably since the COVID-19 pandemic. Its impact extends beyond the workforce, leading to higher medication errors, reduced patient satisfaction, communication issues, and increased complications. While individual-focused strategies such as mindfulness, counseling, and resilience training offer short-term relief, organizational interventions—including better staffing ratios, supportive leadership, healthy scheduling, and safe workplace cultures—are the most effective in reducing burnout. A combined approach yields the best outcomes. Despite extensive research, gaps remain in long-term studies, standardized measurement, and evidence from low-resource settings. Addressing burnout is essential for improving nurse retention and patient safety.

Key Words: Nurse, Burnout, Job – Satisfaction, Impact

Introduction

The nursing profession often represents compassion, dedication, and selflessness. However, beneath their daily commitment lies a growing emotional and physical strain. If this strain continues unchecked, it can lead to burnout. This state causes nurses to feel mentally exhausted, detached, and less effective in their roles. The

Nurse burnout is now a major global issue. Increased hospital workloads, complex patient needs, and ongoing staffing shortages all heighten the pressures nurses face. These challenges impact their mental health, job satisfaction, and the quality of care they provide.

This review brings together recent research to clarify:

• The prevalence of nurse burnout.

• The factors that contribute to burnout.

• The impact of burnout on nurses and patients.

• Potential strategies for preventing or easing burnout.

• The goal is to present these findings clearly and empathetically.

What Is Burnout?

Burnout is more than just feeling tired. It's a deeper and ongoing condition marked by:

1. Emotional exhaustion

Nurses face complete physical and mental depletion, making even simple tasks seem overwhelming.

2. Depersonalization or detachment

Nurses may start to emotionally distance themselves from patients, showing less empathy.

3. Reduced sense of accomplishment

Nurses might feel inadequate or doubt the significance of their efforts, despite their hard work. These feelings build up gradually, often unnoticed, until they affect daily functioning.

How Common Is Nurse Burnout?

Nurse burnout is widespread. Recent studies from several countries show that about one-third to one-half of nurses report feeling emotionally exhausted. Nurses in intensive care units, emergency departments, oncology units, and operating rooms are at the highest risk. Burnout

rates noticeably increased during and after the COVID-19 pandemic. Many nurses also report sleep disturbances, high stress levels, or considering leaving their jobs.

Why Does Burnout Happen?

Research indicates that burnout arises from a mix of stressors rather than a single cause.

A. Work and workload

• Heavy patient loads

• Long shifts and night duties

• Insufficient break times

• Excessive paperwork

• These issues limit nurses' chances for rest and recovery.

B. Emotional strain

Nurses often provide emotional support to patients and their families during tough times. While meaningful, this emotional labor can be exhausting.

C. Organizational issues

• Inadequate staffing

• Lack of supervisor support

• Limited professional development opportunities

• High levels of workplace conflict or bullying

• An unsupportive work environment can worsen burnout.

D. Personal factors

Younger nurses or those early in their careers may be more open to burnout. Additionally, a lack of coping skills or existing stressors can add to the problem.

How Does Burnout Affect Patient Care?

Burnout influences not only nurses but also patients.

Research consistently shows that when nurses are burned out:

• Medication errors rise

• Patient satisfaction falls

• Communication problems occur

• Infections and complications become more common

• Care can be delayed, rushed, or disjointed

• Burnout is a significant patient safety issue, not just a workforce concern.

How Is Burnout Measured?

The Maslach Burnout Inventory (MBI) is the most common tool for measuring burnout. It looks at feelings of exhaustion, detachment, and achievements.

Other tools include:

• Copenhagen Burnout Inventory (CBI)

• Professional Quality of Life Scale (ProQOL)

• Oldenburg Burnout Inventory (OLBI)

• Different tools yield varying results, making comparisons across countries difficult.

What Helps Reduce Burnout?

1. Individual-focused strategies

These strategies do not solve the root problems of burnout but help nurses cope:

• Mindfulness and relaxation programs

These programs assist nurses in managing stress and keeping emotional balance.

• Counselling and peer support

Sharing experiences with others helps reduce feelings of isolation.

• Resilience training

This training provides nurses with strategies for handling stressful events.

• Cognitive-behavioural therapy

This helps nurses change negative thoughts and improve overall mental well-being. These methods work best in the short term, particularly without changes in the workplace.

2. Organizational-level solutions (MOST IMPORTANT)

Workplace conditions primarily impact burnout. Improvements in the work environment can greatly decrease burnout rates.

• Better staffing

Adequate nurse-to-patient ratios ease feelings of being overwhelmed.

• Healthy scheduling

Avoiding long stretches of night shifts and ensuring proper rest times.

• Supportive leadership

Leaders who listen to nurses, involve them in decisions, and appreciate their work can make a big difference.

• Reducing unnecessary paperwork

Automated tools and streamlined workflows give nurses more time to focus on patient care instead of administrative tasks.

• Safe work environment

Implementing a zero-tolerance policy for bullying and violence along with solid reporting systems.

3. Best results come from combining both approaches

A workplace that supports its nurses along with programs that help them build personal resilience is the ideal standard.

This combination leads to:

• Lower stress levels

• Greater job satisfaction

• Better patient outcomes

• Higher nurse retention rates

Reducing burnout requires:

• Supportive leadership

• Safe staffing levels

• Healthier scheduling practices

• Respectful work cultures

• Mental health resources

Gaps in Current Research

Despite extensive studies on burnout, some areas need more exploration:

Insufficient studies examining organizational changes, such as staffing reforms.

Limited research from rural and low-income areas. Few long-term follow-up studies assessing the lasting effects of interventions. Lack of standardized burnout measurement across studies.

Conclusion

Burnout among nurses is a real, widespread issue that affects both the individual and the quality of patient care. It is not just "part of the job"—it signals the need for reform in the system. When nurses feel supported, valued, and cared for, patient care improves naturally. Healthy nurses lead to healthier hospitals.

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Comparative Review of Lotus Birth and Delayed Cord Clamping: Practices, Benefits, And Risks

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Introduction

The umbilical cord functions as a crucial link between the mother and foetus throughout gestation, enabling the exchange of oxygen and nutrients. Subsequent to delivery, the care of this link has progressed into diverse methods, particularly lotus birth and delayed cord clamping (DCC). Both techniques postpone the clamping of the umbilical chord, however they diverge significantly in methodology and clinical consequences. This review assesses the scientific evidence on lotus birth and delayed cord clamping, contrasting their methodologies, advantages, hazards, and clinical guidelines.[1]

Lotus Delivery Definition

Lotus delivery, also known as umbilical cord nonseverance (UCNS), entails leaving the umbilical cord and placenta linked to the newborn until they naturally separate, which usually occurs within 3 to 10 days postpartum. The placenta is cleaned, dried, and stored in permeable containers with absorbent materials like sea salt and dried herbs. To limit the risk of infection, parents should maintain proper cleanliness when handling the placenta. The technique focusses on a calm transition for the infant and spiritual regard for the placenta-newborn relationship.[2]

Delayed Cord Clamping (DCC)

Delayed cord clamping involves postponing the clamping and severing of the umbilical cord for a duration of 30 seconds to 3 minutes following delivery, thereby permitting ongoing blood transfer from the placenta to the newborn. This procedure is conducted in both vaginal and caesarean deliveries, with protocols focussing on prompt neonatal care, preservation of body temperature, and the monitoring of vital signs during the waiting period. The placenta is

expelled following cord severance, and uterotonic agents are administered to the mother to regulate uterine tone.[3]

Physiological Basis and Rationale

Lotus birth builds upon the concept of delayed cord clamping by permitting the umbilical cord to separate naturally, which is theorised to facilitate a more organic and less invasive transition from foetal to neonatal life. Proponents argue that this approach enables complete placental transfusion and aids in the development of the infant's immune system.

Delayed cord clamping is supported by evidence indicating that permitting placental blood transfusion to the newborn increases blood volume, enhances iron stores, and improves stem cell transfer, thereby benefiting neonatal haematologic and immunologic status.[4]

Benefits

Lotus Birth: Helps the baby have a tranquil and less traumatic birth. It also allows for progressive placental transfusion, which could increase the baby's blood volume and iron content. - Could lower the chance of getting hurt in the umbilical cord, like avulsion. - Seen as a spiritual or cultural activity that honours the relationship between the placenta and the newborn.[5]

Delayed Cord ClampingTerm Infants:

Boosts early newborn haemoglobin and ferritin. Increases iron storage, lowering anaemia risk at 2-4 months. Helps transplant immune-critical stem cells.

Preterm Infants:

Lowers the chance of necrotising enterocolitis and intraventricular haemorrhage. Boosts red blood cell volume and cuts down on the need for blood transfusions. Helps the body's blood get better after giving birth.[6]

Risks and Challenges

Lotus Birth

The placenta, upon separation from maternal circulation, transforms into necrotic tissue, heightening vulnerability to bacterial colonisation and infection, potentially endangering the

newborn. - Absence of standardised clinical guidelines or scientific validation for methods of placenta preservation. - Risk of inadvertent cord avulsion, resulting in injury to the neonate. –

Ethical issues emerge from the lack of medical consensus and the associated risks to neonates.

Delayed Cord Clamping- The placenta, upon separation from maternal circulation, transforms into necrotic tissue, heightening vulnerability to bacterial colonisation and infection, potentially endangering the newborn. - Absence of standardised clinical guidelines or scientific validation for methods of placenta preservation. - Risk of inadvertent cord avulsion, resulting in injury to the neonate. - Ethical issues emerge from the lack of medical consensus and the associated risks to neonates.

Scientific Evidences

Lotus Birth: Scientific Evidence

- There is limited scientific data to suggest the benefits of lotus birth. The majority of studies and expert assessments point to a lack of substantial data on neonatal safety and efficacy.
- While some anecdotal stories suggest that lotus birth can reduce stress and increase bonding, controlled trials have not supported these claims.
- The placenta's necrotic tissue after birth can harbour germs, increasing the risk of infection for newborns.
- Because of these issues, no major medical organisation recommends lotus delivery, and most urge parents to check for infection if they choose this approach.

Delayed Cord Clamping: Scientific Evidence

- Research strongly endorses delayed cord clamping (DCC). Research indicates that delaying cord clamping for 30–180 seconds post-delivery enhances infant blood volume, haemoglobin levels, and iron reserves, hence diminishing the likelihood of anaemia and enhancing haematological results.
- DCC in preterm newborns correlates with a 32–69% diminished risk of mortality before to discharge, a reduction in blood transfusions, and a lower occurrence of necrotising enterocolitis and intraventricular haemorrhage.
-

- DCC does not elevate the risk of substantial maternal problems, including postpartum haemorrhage, and is endorsed by the World Health Organisation (WHO), the American College of Obstetricians and Gynaecologists (ACOG), and other prominent health organisations.
- Recent systematic evaluations indicate that most placental transfusion transpires within the initial 3 minutes post-delivery, and there is no data supporting the advantages of clamping beyond this timeframe.

Clinical Recommendations and Ethical Considerations

International health organisations strongly advocate delayed cord clamping because there is strong evidence that it helps newborns without putting mothers at risk. It is part of the standard treatment for newborns, whether they are born vaginally or by caesarean section. On the other hand, lotus birth is still controversial and has little scientific backing. Doctors often warn against using it all the time because of the danger of infection and the lack of established care methods. Parents who want to have a lotus birth should talk to experts and think carefully about the hazards involved.[7]

Conclusion

Lotus delivery and delayed cord clamping preserve placental blood flow to optimise the newborn's transition. Scientific research shows that delayed cord clamping has haematological and immunological benefits with little hazards. Lotus birth is culturally and spiritually significant but unproven and infectious.

While respecting parental preferences and offering educated lotus birth counselling, healthcare staff should prioritise evidence-based treatments like delayed cord clamping. Lotus birth needs more research to create standardised standards and safety profiles before it can be widely advised.

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Transforming Gen Z Nursing Education Through The Jigsaw Technique

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Abstract

This review article synthesizes evidence from recent studies on the application of the Jigsaw cooperative learning technique in nursing education, with a focus on its transformative potential for Gen Z learners. The Jigsaw method, which involves structured peer teaching and group interdependence, has been shown to significantly enhance cognitive achievement, knowledge retention, self-regulated learning, and student engagement compared to traditional lecture-based approaches. Findings from quasi-experimental and interventional studies indicate that Jigsaw not only improves academic outcomes but also fosters positive attitudes, teamwork, and a supportive learning environment. The integration of Jigsaw with self-regulated learning frameworks further strengthens metacognitive skills and motivation among nursing students. Despite challenges related to time and faculty training, the evidence supports the adoption of Jigsaw as a core pedagogical strategy to align nursing education with the collaborative, active, and technology-rich expectations of Gen Z learners.

Introduction

In the vibrant tapestry of modern education, Gen Z nursing students stand as digital natives, weaving their expectations for dynamic, collaborative, and meaningful learning experiences. Yet, the traditional undergraduate nursing curricula often cling to the well-worn paths of lectures and tutor-driven methods. This discordant symphony leads to a lackluster engagement, shallow learning, fleeting retention, and stunted growth in higher-order skills like self-regulation, teamwork, and problem-solving. Enter the Jigsaw technique, a cooperative learning structure that elegantly bridges these chasms. By distributing responsibility, fostering positive interdependence, and embedding peer teaching into the very fabric of classroom activity, it transforms the learning experience into a harmonious and enriching journey.

Concept of the Jigsaw Technique

The Jigsaw technique stands as a transformative cooperative learning strategy, revolutionizing the educational landscape by fostering deep understanding and collaboration. In this dynamic approach, students engage in two-tiered group interactions: "expert" groups, where they delve into and master specific subtopics, and "home" (jigsaw) groups, where each expert imparts their knowledge, completing the intricate "puzzle" of the topic. Variants such as Jigsaw I–IV, reverse Jigsaw, and subject Jigsaw, while differing in sequencing, expert assessment, and feedback mechanisms, universally embody the core principles of shared responsibility, structured interdependence, and individual accountability. In the realm of health-profession education, the Jigsaw technique has proven its unparalleled adaptability and effectiveness, successfully applied in diverse areas such as microbiology, maternity nursing, basic nursing procedures, and CPR. This versatility underscores its capacity to seamlessly integrate both theoretical and skills-oriented content, making it an indispensable tool for educators seeking to enhance learning outcomes and foster a collaborative learning environment.

Evidence of Cognitive Benefits

Jigsaw consistently raises knowledge scores, absolute success levels, and retention compared to regular lectures or tutorials. In a quasi-experimental study conducted in India involving 50 MBBS and 50 B.Sc. nursing students, Jigsaw groups in microbiology demonstrated significantly higher post-test and retention scores, exhibiting large effect sizes and superior absolute achievement levels compared to tutorial groups, a trend that persisted even in crossover designs. In a study involving maternity nursing students in Egypt (n=310), Jigsaw groups demonstrated significantly greater immediate and four-week follow-up achievement in normal and high-risk pregnancy content compared to lecture groups, suggesting benefits for both initial learning and long-term retention.

Self-Regulated Learning and Engagement

Incorporating Jigsaw into a systematic self-regulated learning (SRL) cycle is especially pertinent for Generation Z, who must operate as lifelong learners in the context of swiftly changing therapeutic practices. A Chinese quasi-experimental study in a Basic Nursing course (n=84) integrated the Jigsaw method into Zimmerman's three-phase Self-Regulated Learning

(SRL) model (forethought, performance, self-reflection), incorporating cycles of self-study, expert group discussions, Jigsaw group instruction, and structured reflection. In comparison to a lecture-based control, the intervention group exhibited significantly elevated total self-regulated learning (SRL) scores, particularly in learning motivation, cooperative ability, and information literacy, as well as enhanced learning engagement (vigour and devotion), with effect sizes in the moderate range. Repeated measures studies indicated that self-assessment and peer-assessment scores (motivation, task completion, cooperation) improved across cycles, implying a gradual enhancement of metacognitive and collaborative skills.

Perception of Educational Environment

The Jigsaw method significantly enhances students' perception of the educational environment, which is essential for the satisfaction, well-being, and persistence of Generation Z learners. An interventional study conducted in Iran involving 100 nursing and emergency medicine students during a CPR course revealed that the Jigsaw group's total DREEM score increased from a weak environment (~47/200) to a strong, highly positive environment (~158/200), demonstrating significant improvements across all subscales (learning, teachers, academic self-perception, atmosphere, social support). In contrast, the traditional group exhibited no meaningful change. The observed changes demonstrate that Jigsaw can swiftly convert a didactic, low-involvement context into a collaborative, supportive, and learner-centred environment, even in a brief, skills-focused workshop.

Attitudes, Motivation and Affective Outcomes

Jigsaw improves students' attitudes towards learning, confidence, and contentment, according to studies conducted in maternity and other nursing environments. Students in the Jigsaw group in the Egyptian maternity nursing study not only performed better than those in the lecture group, but they also expressed more positive opinions about the teaching approach and strongly agreed with claims of enhanced communication, teamwork, critical thinking, and decision-making skills, as well as a wish to see Jigsaw used in more theory and practice classes. Similar to this, even though some students complained that preparation took a lot of time, more than 80–90% of students in the microbiology study stated that Jigsaw enhanced comprehension, made subjects simpler, encouraged responsibility for learning, and offered a fun peer learning experience.

Alignment with Gen Z Characteristics

Gen Z students prioritise autonomy, technological integration, collaboration, and regular feedback; they also tend to multitask and may possess shortened attention spans in passive settings. Jigsaw aligns with these preferences by:

Active preparation before and during class is required, allowing learners greater control over their pacing and resources.

Implementing peer teaching and heterogeneous grouping facilitates social learning, networking, and exposure to diverse perspectives.

Incorporating immediate feedback from peers and faculty through expert group clarification, home group instruction, and post-session debriefs addresses the need for prompt responses and acknowledgement among Generation Z.

The integration of digital resources (videos, PowerPoint presentations, online material platforms) inherently facilitates blended and technology-enhanced environments anticipated by Generation Z

Table – I: Comparative View: Jigsaw vs Traditional Teaching

Dimension	Jigsaw technique (from attached studies)	Traditional lecture/tutorial
Knowledge achievement	Higher post-test and follow-up scores in microbiology, maternity, CPR and basic nursing.	Modest gains; often no significant change in delayed or environment-perception measures.
Retention of knowledge	Significantly better 3–4-week retention in microbiology and maternity courses.	Greater forgetting; lower absolute achievement and retention scores.
Self-regulated learning (SRL)	Improves motivation, cooperation, information literacy within an SRL framework.	Little structured support for SRL; reliance on teacher direction.
Learning	Higher vigor, dedication and	Minimal change in engagement

engagement	overall engagement after intervention.	indices.
Perception of learning climate	DREEM scores shift from weak to very positive across all domains in CPR training.	No significant improvement in DREEM subscores.
Attitude toward learning method	More positive attitudes, preference for wider adoption, perceived gains in critical thinking and teamwork.	Mixed; some students comfortable, but many view lectures as passive and less effective.
Teamwork and communication	Stronger perceived cooperation, peer support and communication skills.	Limited opportunities for structured peer collaboration.
Faculty role	Facilitator, designer of tasks, monitor of group dynamics and assessor.	Primary knowledge transmitter with limited small-group oversight.

Design Considerations for Gen Z Nursing Curricula

To "transform" nursing education for Gen Z instead of just using Jigsaw once, the method needs to be built into the curriculum and courses in a systematic way. Some important design features that come from the research attached are:

- **Careful topic selection and chunking:** Choose content that can be logically subdivided into complementary "puzzle pieces" (e.g., sub-topics within pregnancy complications, CPR components, nursing procedures).
- **Heterogeneous grouping:** Form home groups mixing academic ability, gender and background to maximise peer scaffolding and balanced participation, as in the SRL–Jigsaw study.
- **Assessment alignment:** Use pre-tests, post-tests, retention tests and validated scales (e.g., SRL, engagement, DREEM, attitude scales) to capture cognitive and affective outcomes and provide data for iterative improvement.
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- **Structured reflection and feedback:** Build in self-assessment, peer assessment and experience-sharing phases after each cycle to reinforce metacognitive growth and professional behaviours.
- **Faculty development:** Train nurse educators in planning Jigsaw sessions, managing group dynamics, using evaluation frameworks (e.g., Kirkpatrick levels I–II) and integrating digital tools that support Gen Z learners.

Challenges and Limitations

The attached articles emphasise time constraints, the risk of unequal participation, and the necessity for faculty competence as significant practical challenges. Certain students view preparation for Jigsaw as time-intensive, and those with lower performance may experience pressure or hinder group progress in the absence of sufficient support and oversight. Brief interventions, such as 2-day CPR or 12-hour SRL–Jigsaw sequences, may not adequately cultivate the self-management aspects of self-regulated learning, indicating that a sustained, longitudinal approach is more effective. Further research is necessary to evaluate clinical performance outcomes and to identify barriers to large-scale adoption in crowded curricula and resource-limited settings.

Implications and Future Directions

Medical, maternity, basic nursing, and emergency education research supports the Jigsaw technique as an effective pedagogical lever to match nursing education with Gen Z learners' needs and develop fundamental professional competencies. Curriculum-wide planning, institutional support for active learning spaces, and assessment systems that promote collaboration, reflection, and ongoing learning above test achievement are needed to scale this transition. Future research might integrate Jigsaw-based learning in theory courses with objective measures of clinical reasoning, teamwork, and patient safety in practice to close the loop between classroom innovation and Gen Z nursing performance.

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Stability indicating development and validation of RP-HPLC method for the estimation of Bilastine from bulk drug

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Abstract

Using RP-HIPLC to reliably and quantitatively estimate Bilastine was the goal of this effort. Regardless, it is an antihistaminic medication that helps with allergic reactions. With the use of an analytical tool like HPLC, a more recent and sensitive technique was created (Waters, 1525, UV-detector). Chromatographic separation was carried out using a high-quality combinational solvent system consisting of Phenomenex Luna (18-Columns) and Acetonitrile (ACN): Water (40:60). Operating in isocratic mode, with a flow rate of 1 ml/min. At an injection volume of 10µL, within the first seven minutes of operation. Chromograms were observed at a wavelength of 245 nanometers. A retention period of 2.77 minutes was recorded for bilastine, which displayed a peak area of 370133. The theoretical plate was 3334, and the tailing factor was 1.11. The linear calibration curve yielded an R2 value of 0.99984. In order to validate our method, we followed the ICH requirements and looked at things like the solubility index, repeatability, accuracy, linearity, robustness, and degradation studies. As a quality control measure, this technique was useful for quantitatively assessing Bilastine samples.

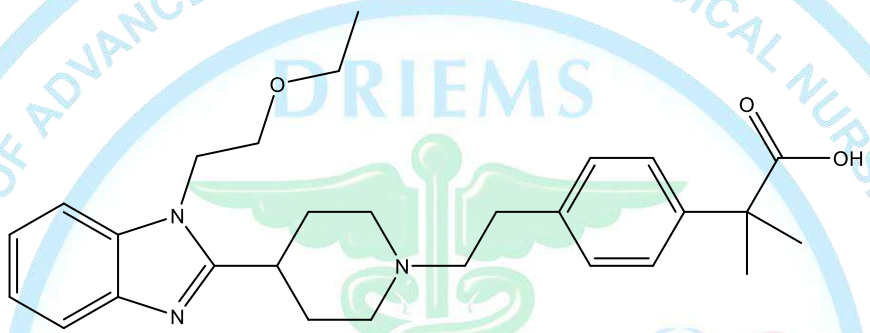
Key-Words

Anti-histaminic; RP-HPLC; Validation; Bilastine; ICH-Guidelines.

INTRODUCTION

A piperidine class of 2nd generation of anti-histaminic novel medication is Bilastine. Which prevents the activation of the H1 histamine receptor[1]. This drug is a white crystalline powder used to treat rhinoconjunctivitis and urticaria. It is known for it's rapid onset and prolonged duration of

action[2,3]. Bilastine can be estimated quantitively through precise instrumentation and accurate method (Like RP-HPLC & UV-Spectrophotometric)[4-6]. This research aims to develop a new economically sensitive and precise analytical method for the quantitative determination of Bilastine though ICH-guidelines[7,8]. In HPLC, two most prominent methods are widely accepted: normal phase HPLC (NP-HPLC) & another one is reverse phase HPLC (RP-HPLC). In reverse phase, the stationary phase is more non-polar than mobile phase. e.g. C-18 silica, RMe_2SiCl & organic miscible solvents like (Methanol, ACN)[9,10].



2-(4-(2-(4-(1-(2-ethoxyethyl)-1*H*-benzo[*d*]imidazol-2-yl)piperidin-1-yl)ethyl)phenyl)-2-methylpropanoic acid
Chemical Formula: $C_{28}H_{37}N_3O_3$
Exact Mass: 463.28
Molecular Weight: 463.62
m/z: 463.28 (100.0%), 464.29 (30.8%), 465.29 (5.2%), 464.28 (1.1%)
Elemental Analysis: C, 72.54; H, 8.04; N, 9.06; O, 10.35

Figure 1: Structure of Bilastine

Materials & Methods

An essential active pharmaceutical ingredient (API) for this research is Bilastine, which was received as a gift sample from "Syncrop Clinecare Technologies (P) Ltd. Hydrabad". We procured HPLC-grade water, ACN, and ethanol from 'Marck (P) Ltd. Mumbai'. DMSO & DMF were procured from 'CDH Fine Chemicals, New Delhi, India'. Binary HPLC system (Model 1525, Waters) equipped with 717 plus Autosamplers and Photodiode Array Detector (PDA), which was managed by Empower-2 software.

Method Development

a. Sample Preparation

Ten milligrams of Bilastine Standards were transferred into a previously calibrated volumetric round bottle flask (10ml). Add methanol into it & allow to dissolve. Then the final volume is made up to the mark with the respective solvent (MeOH).

b. Detection of wavelength

The standard stock solution and a blank were placed in a quartz cuvette and loaded into the UV-Vis chamber to detect wavelengths (200 to 400 nm) using UV-Vis spectroscopy. The λ_{max} of Bilastine was detected at 245 nm.

The absorption spectrum is shown in Figure 2.

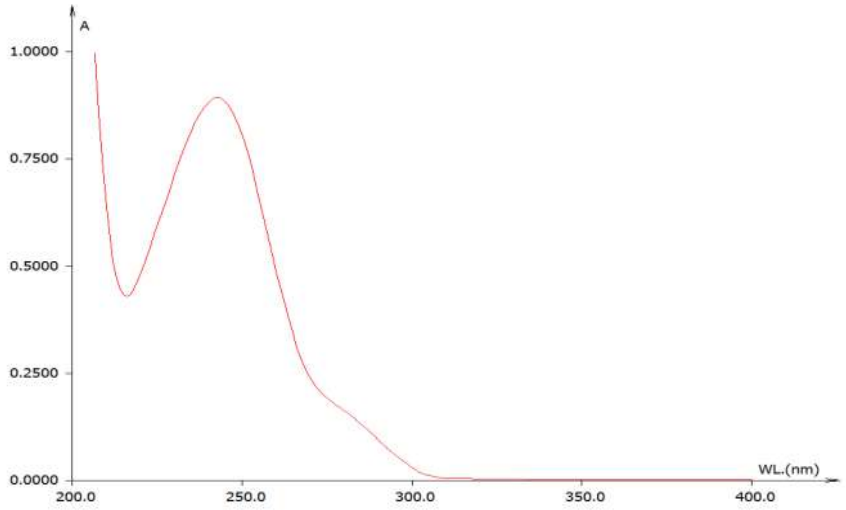


Figure 2: UV-Spectrum of Bilastine

c. Solubility index

The solubility index of the drug was investigated under various chromatographic conditions. Different ratio of ACN and water were prepared. ACN was injected at five different volumes at a flow rate of 1.0 ml/min into a symmetry C-18 column. Retention time (RT), theoretical plate, peak area, & tailing factor were recorded at a wavelength of 245nm. The results are tabulated in Table 1. Based on these results, the ACN: Water (40:60)

ratio was chosen for further study. The conditions for this study included flow rate, injection volume and running time of 1.0 ml/min, 10µl, and 7min respectively.

Table 1: Solubility index

Trial	Mobile Phase *(ACN : Water)*	Flow Rate	Wave length	RT	Peak Area	Theoretical Plates	Tailing Factor	Result
1	65 : 35	1.0 ml/min	245 nm	3.539	138731	2664	1.09	Method rejected
2	55 : 45	1.0 ml/min		2.127	174431	3251	1.87	Method rejected
3	30 : 70	1.0 ml/min		2.720	223451	3078	1.07	Method rejected
4	***40 : 60***	***1.0 ml/min***		***2.770***	***236541***	***3165***	***1.06***	***Method accepted***
5	50 : 50	1.0 ml/min		2.718	317832	3034	1.08	Method rejected

d. Chromatograms at different concentration

To get 10 parts per million, 1 milliliter of stock solution was transferred to a 10-milliliter volumetric flask and the volume was adjusted with MeOH to 10 parts per million. A 15-minute sonication was subsequently applied to the test solution. Similarly, concentrations of 12, 14, 16, and 18 ppm were generated. Chromatographic separation was accomplished using an isocratic mode and a more appropriate mobile phase, such as ACN:Water (40:60), on a Phenomenex Luna C-18 Column (250mm × 4.6mm, 5µm particle size). The flow rate was set at 1.0 ml/min. The chromatogram was obtained at 245nm and the injection volume was 10µl. Figure 3 displays the chromatographic conditions.

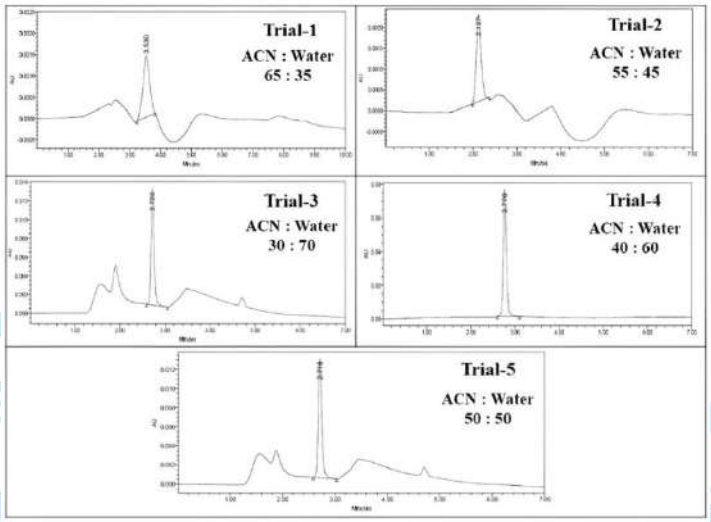


Figure 3: Chromatogram for different solvent ratio trials

e. Preparation of drug solution

Ten milligrams of Bilastine were taken into a dry, cleaned & previously calibrated 10ml volumetric flask. Then a solution with known concentration of approximately 1000 mcg/ml or 1000 ppm was prepared using mobile phase to dissolve and dilute to volume. The final concentration was made to 10 µg/ml.

Method of validation

After a suitable method development for this research, validate the same through different validation aspects mentioned in the International Conference on Harmonization (ICH) guideline.

a. Suitability Test

An important part of many analytical processes is suitability testing. The idea behind these tests is that the components that need to be examined the equipment, the analytical procedures, the electronics, and the samples that will be examined form a cohesive system. The standards for the system appropriateness evaluations were subsequently established. Table 2 displays the data.

Table 2: Suitability Study

Sr. No.	Injection no	RT	Area	Height	USP Plate count	USP Tailing
1	First	2.765	376853	35874	3387	1.2
2	Second	2.743	368892	32987	3476	1.2
3	Third	2.778	376542	35432	3524	1.1
4	Fourth	2.779	377865	35887	3396	1.2
5	Fifth	2.783	366547	32118	3267	1.3
6	Sixth	2.779	377774	35332	3389	1.3
Mean			**374078.8333**		**3406.5**	**1.2**
S.D			**5007.67928**			
%RSD			**1.3**			

b. Accuracy

The accuracy of the proposed approach was evaluated in recovery trails using pure Bilastine at three different concentrations (80%, 100%, and 120%), with three injections into the HPLC equipment per concentration. Numbers representing percentages of recovery were obtained by solving the linearity equation, y=350063x +7497. Feel free to peruse the table for the results. The findings can be found in Figure 4 and Table 3.

Table 3: Accuracy Readings

Sample ID	Concentration (µg/ml)		RT	Peak Area	Theoretical Plates	Tailing Factor	% Recovery of Pure drug	Statistical Analysis	
	Amount Injected	Amount Recovered							
S_1 : 80 %	8	7.84	2.803	282679	3032	1.122	98.10	99.646 ± S.D. = 1.76052 % R.S.D.= 1.776	% Mean Recovery = 99.686 %
S_2 : 80 %	8	8.09	2.796	291485	3541	1.15	101.24		
S_3 : 80 %	8	7.96	2.800	286887	3689	1.20	99.60		
S_4 : 100 %	10	9.82	2.768	351867	3102	1.26	98.21	Mean = 99.19 S.D. = 1.53580 % R.S.D. = 1.548	
S_5 : 100 %	10	10.09	2.784	361521	3745	1.23	100.96		
S_6 : 100 %	10	9.84	2.786	352549	3682	1.19	98.40		
S_7 : 120 %	12	11.89	2.794	424476	3254	1.22	99.10	Mean = 100.223 S.D. = 1.61317	
S_8 : 120 %	12	12.23	2.780	436546	3513	1.16	101.97		

S_9 : 120 %	12	11.95	2.775	426574	3166	1.08	99.60	% R.S.D. = 1.6296	

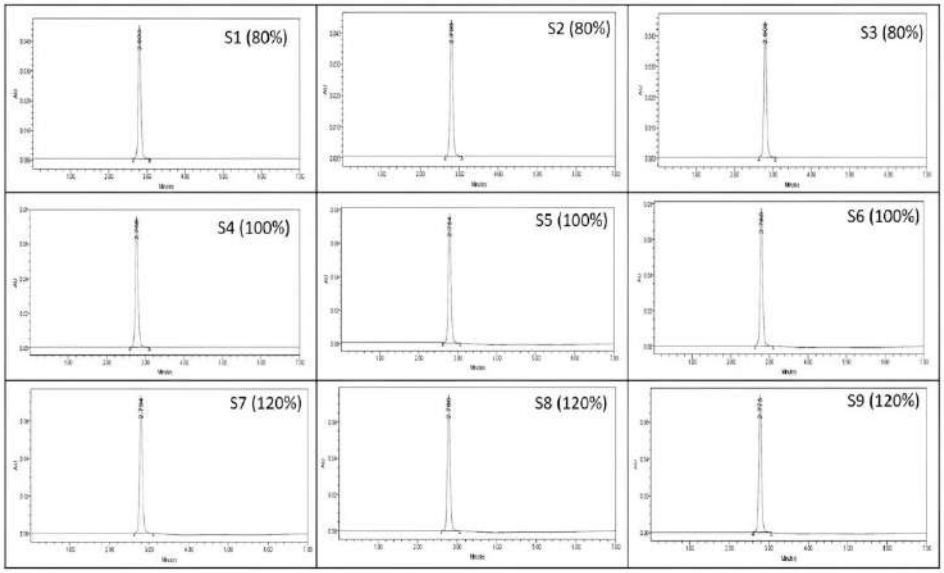


Figure 4: Chromatogram for Accuracy

c. Precision

I. Repeatability

The accuracy of each method was evaluated using the peak areas and retention times obtained from six independent determinations of a fixed dosage of the drug Bilastine (API). The results are shown in Table 4 and Figure 5.

Table 4: Repeatability readings

HPLC Injection Replicates of Bilastine	Retention Time	Peak Area	Theoritical Plates	Tailing Factor
Replicate – 1	2.777	321731	3263	1.53

Replicate – 2	2.857	327238	3841	1.41
Replicate – 3	2.789	326622	3352	1.18
Replicate – 4	2.797	322392	3682	1.19
Replicate – 5	2.797	325119	3125	1.02
Replicate – 6	2.799	328435	3685	1.16
Average	**2.80266**	**325256.166**	**3491.33**	**1.24**
Standard Deviation	**0.02784**	**2703.5980**	**-**	**-**
% RSD	**0.993**	**0.83**	**-**	**-**

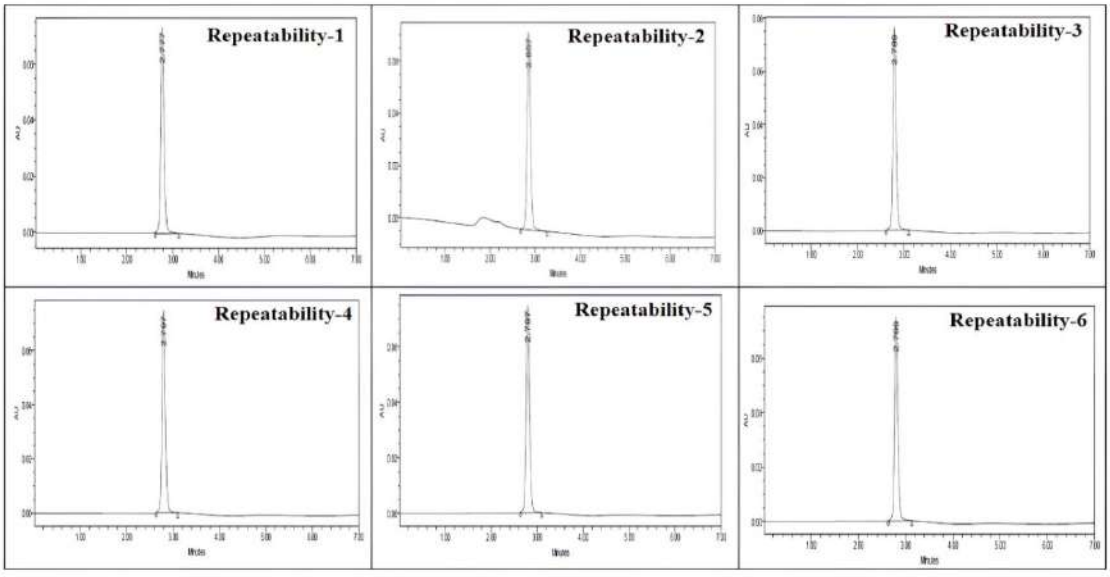


Figure 5: Chromatogram for Precision

II. Intermediate Precision

The two different approaches were used for the intermediate precision.

i. Intra day

The first one was Intra day i.e., the involves the injecting volume of 80%, 100%, and 120% concentration at a various time during the same day.

ii. Inter day

The second one was Intra day method. In this method, the solutions (80%, 100% and 120%) were injected at varying times on different days.

d. Linearity & Range

The analyte was diluted and sonicated in a series of concentrations ranging from 6-14 µg/ml with mobile phase. The HPLC system was chromatographed under the optional conditions after 10µl injections of each concentration were made from these solutions. A calibration curve was created and presented by Figure 6,7 and Table 5.

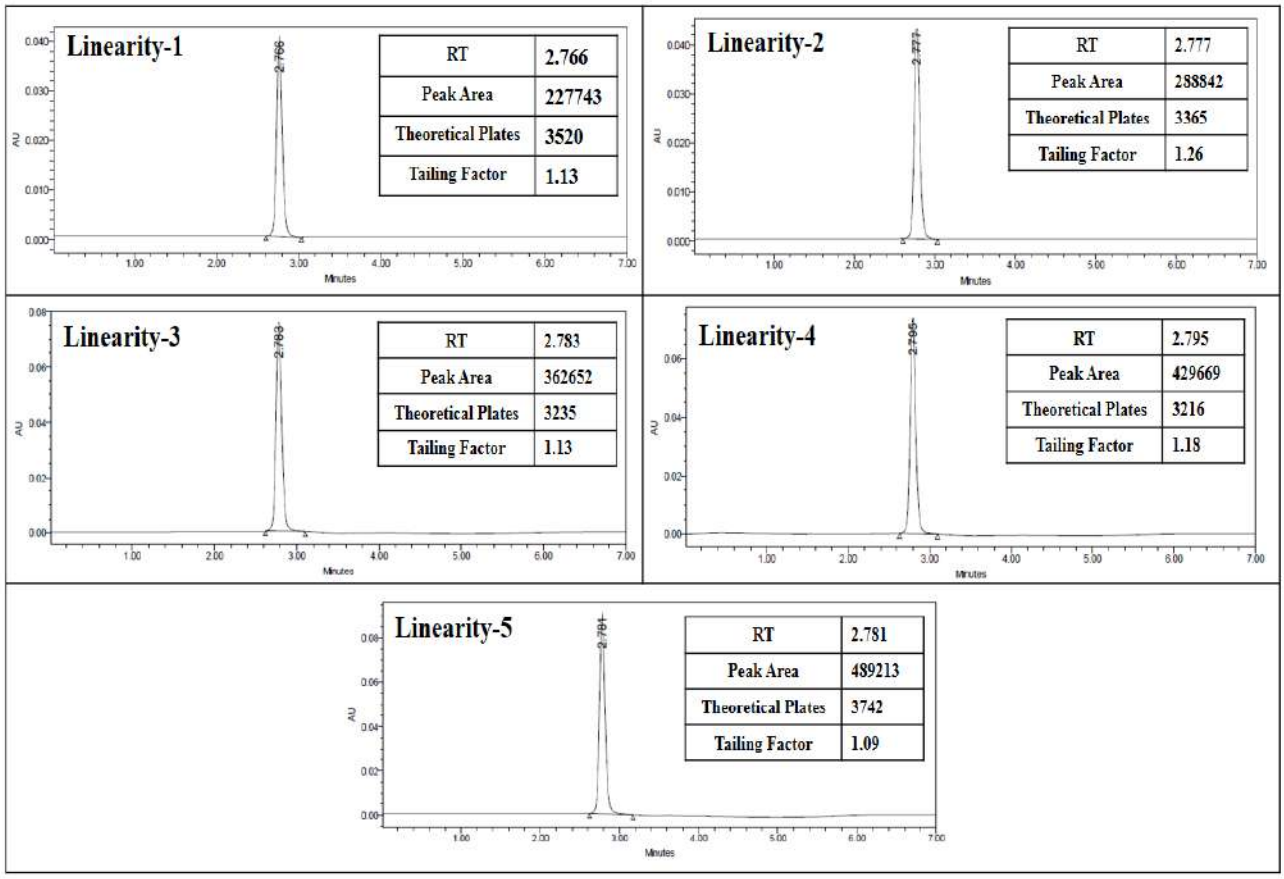


Figure 6: Chromatogram for Linearity

Table 5: Concentration of Bilastine on Calibration Curve

Concentration(in ppm)	Peak Area
0	0
6	227743
8	288842
10	362652
12	429669
14	489213

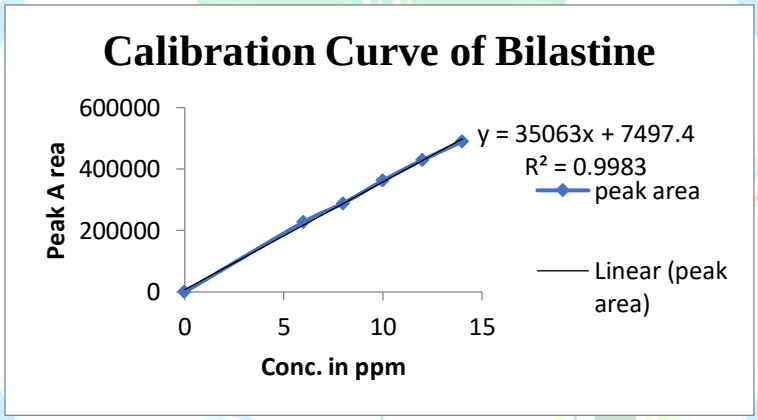


Figure 7: Calibration Curve of Bilastine (API)

e. Robustness

In order to determine the method's resilience, the effect of small changes to the chromatographic parameters, like a 1 ml flow rate change (±0.1 ml/min), a 245 nm wavelength of detection change (±2nm), and a 60 nm organic phase content change (±5%), were studied. The results, which had an RSD of less than 2%, also provided support for the established RP-HPLC method for analyzing Bilastine (API).

Estimation of Bilastine in Tablet (BILAFAV 20mg)

This medication, Bilafav 20 mg, is made by Cipla Pharmaceutical Limited and was purchased from the pharmacy. With each film-coated pill comes 20 milligrams of Bilastine (API). Following the directives of the Indian Pharmacopeia (2018), twenty Bilafav tablets were consumed in order to ascertain the mean weight. Triturating the tablets with a mortar and pestle to obtain a powder followed the determination of weight. A volumetric flask that had been cleaned, dried, and calibrated was then filled with 8 milliliters of mobile phase and 10 milligrams of the triturated powder. To get rid of any air bubbles, the mixture was set in the sonicator for 15 minutes after a good mixing. The last volume was filled during the mobile phase. To get a concentration of 10 ppm, mix 10 ml of the mobile phase (MeOH) with a milliliter of the stock solution that was properly pipetted out. Prior to sonication, pass the mixture through a 0.45 µm membrane filter for further filtration. This technique was repeated multiple times with varying ppm concentrations (12ppm, 14ppm, 16ppm, and 18ppm) of the produced solution fed into the HPLC autosampler. In order to determine the assay %, we used formula 1 and recorded the findings in the table.

$$\%\ \text{Assay} = \frac{AT}{AS} \times \frac{WS}{DS} \times \frac{DT}{WT} \times \frac{P}{100} \times \frac{AW}{LC} \times 100 \ldots\ldots\ldots\ldots\ldots\ldots\ldots [1]$$

Where; AT-Peak area of test sample, AS-peak area of standard, WS-working standard (mg), WT-sample weight, DS- dilution for standard, DT-dilution for sample, P-working standard purity (%). The results were tabulated in the Table 6.

Table 6: Assay of Bilastine Tablets

Brand name of Tablets	Labelled amount of drug (mg)	Mean (SD) amount (mg) found by the proposed method (n=5)	Assay + % RSD
BILAFAV Tablets	20	19.9 (0.08)	99.56% (0.58)

Stability Study

Degradation of Bilastine (API) was a part of the stability study methodology. To determine how much and how quickly bilastine would degrade when stored or consumed, it was subjected to various stress settings. In comparison to real-time stability testing, this expedited stability analysis

sheds light on the drug's probable degradation pathway in a shorter amount of time. Hydrolysis under pressure, whether acidic or basic, thermal, oxidative, or photosynthetic, is an important area to investigate.

i. Acid Hydrolysis

After meticulous measurement, ten milligrams of the pure medication was transferred to a dry, clean, and calibrated volumetric flask. After adding 30 ml of 0.1 N HCl, the flask was refluxed in a water bath set at 60°C for 4 hours. Diluting with 0.1 N NaOH neutralized the mixture once it cooled to room temperature. The mobile phase was used to get the total amount down to 10 ml. To begin injecting the solution into the HPLC system, we first utilized this mobile phase as a blank. Then, we tweaked the mobile phase compositions for optimal performance. Repeated experiments with the same concentration of 0.1 N HCl allowed us to detect the deterioration curve.

ii. Basic Hydrolysis

An accurately measured ten milligram dose of the medication was put to a sterile, calibrated, dry volumetric flask. It was then refluxed for four hours at 60°C in a water bath after 30 ml of 0.1N NaOH solution was added to it. Using a 0.1 N HCl solution, the sample was neutralized after cooling, and the concentration was adjusted to 10 µg/ml with the use of the mobile phase. Once it was optimized, it was injected into the HPLC system as a blank, taking into account the mobile phase. For the purpose of observing its deterioration profile, the same concentration of 0.1N NaOH was used repeatedly. The results are documented in the chromatograms..

iii. Thermal Degradations

A volumetric flask that was clean, sterile, and dry was used to hold 10 mg of pure medication. This was then refluxed in a water bath set at 60°C continuously for 6 hours after adding 30 ml of HPLC grade water. After the medicine has become soluble, let the mixture cool and reflux. A concentration of 10 µg/ml was achieved by employing the mobile phase. After that, the mobile phase, which served as a blank, was injected into the HPLC apparatus after the solution.

Oxidation with (3%) H_2O_2

A sterile, clean and dry volumetric flask (100ml) was taken along with 10 mg of pure drug was placed with 30 ml of 3% H_2O_2 and added a Some mobile phase were to facilitate the solubility. The flask was then left undisturbed in darkness for 24 hrs. Then the final volume was adjusted up to the mark. Then this solution was subsequently injected into the HPLC system by following the mobile phase as the blank.

i. Photolytic degradation

Ten milligrams of the pure drug were placed over a sterile petri plate and placed in a UV-chamber for 24 hrs. at a wavelength of 245 nm. The drug solution (10 µg/ml) was prepared by using a UV-exposed drug. This solution then analysed with the help of HPLC against blank.

The results of degradation study were tabulated in the Table 7 and Figure 8.

Table 7: Results of forced degradation studies of Bilastine

Stress condition	Time	Assay of active substance (%)	Assay of degraded products	Mass Balance (%)
Acid Hydrolysis (0.1N HCl)	24Hrs.	99.2	0.8	100
Basic Hydrolysis (0.1N NaOH)	24Hrs.	99.5	0.5	100
Thermal Degradation (60^0C)	24Hrs.	98.9	1.1	100
UV (254nm)	24Hrs.	99.3	0.7	100
3% Hydrogen peroxide	24Hrs.	99.9	0.1	100

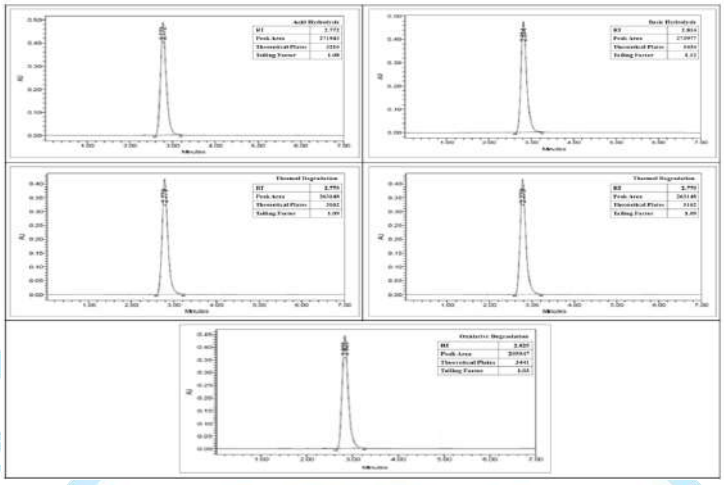


Figure 8: Chromatogram showing degradation

RESULTS

The analytical method of RP-HPLC was used to quantify bilastine, with an optimized mobile phase composed of acetonitrile and water in a ratio of 40:60. With detection at 245 nm, the technique demonstrated a flow rate of 1.0 ml/minute. Even though the run only took seven minutes, the chromatographic peak displayed a theoretically outstanding plate count and symmetry. With mean percentage recovery values of 99.686 ± 1.76%, 99.19 ± 1.54%, and 100.223 ± 1.61%, respectively, for 80%, 100%, and 120% sample solutions, these values were within the acceptable range of 98-102%. Accuracy was demonstrated by %RSD values of 1.776%, 1.548%, and 1.629%, respectively. Compliance with ICH criteria was achieved with a %RSD of 0.83% for peak area and 0.993% for retention time (RT). Inter- and intra-day variations demonstrated %RSDs and standard deviations below 2%, indicating that the measurements were accurate. Within the concentration range of 6-14 µg/ml for Bilastine, the calibration curve showed remarkable linearity ($R^2 = 0.998$). You can see the regression equation here: $y = 35063x + 7497$.

DISCUSSION

The % Purity of BILAFAV tablets containing Bilastine was determined to be 99.56 ± 0.58%, indicating high purity of the active pharmaceutical ingredient (API) in the formulation. Degradation Studies; Bilastine remained stable under various stress conditions including acidic,

basic, thermal, photolytic, and oxidative conditions. Assay results under these stress conditions ranged from 98.9% to 99.9%, confirming the stability of Bilastine. The RP-HPLC method provided robust analytical results for the determination, quantification, and stability assessment of Bilastine, highlighting its suitability for pharmaceutical analysis and quality control purposes.

CONCLUSION

The developed RP-HPLC method is precise, accurate, linear, specific, and suitable for the stability-indicating analysis of Bilastine. It can also be used for assay and impurity studies in various formulations. The method is preferred due to its simplicity, reproducibility, and effectiveness in achieving good peak shape, resolution, and absorbance, which may be preferred by the scientific community.

CONFLICT OF INTEREST

The authors declared no conflict of interest.

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