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"EMPOWERING LEADERSHIP AND JOB SATISFACTION: A META-ANALYTICAL EXPLORATION SPANNING 2011-2021"

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ABSTRACT

This meta-analytical study delves into the intricate relationship between Empowering Leadership (EML) and Job Satisfaction (JS) across 13 primary studies. Employing rigorous statistical methodologies, including the Galbraith plot, effect size analysis, and the Trim and Fill Method, our research substantiates a statistically significant and moderate positive correlation between EML and JS. The findings unveil a robust connection that withstands scrutiny, highlighting the transformative potential of EML on employee satisfaction. As organizations navigate the complex landscape of leadership dynamics, this research not only contributes empirical insights but also serves as a strategic compass, guiding leaders towards fostering empowering practices for enduring organizational success.

KEYWORDS: *Empowering Leadership, Job Satisfaction, Meta-Analysis.*

1. INTRODUCTION:

In the ever-evolving landscape of organizational dynamics, empowering leadership (EML) has emerged as a pivotal focus within scholarly discourse. Leadership practices that endorse employee empowerment, delegate authority, and cultivate an environment conducive to

individual growth have become integral to organizational success. This meta-analytical inquiry aims to systematically explore the intricate relationship between empowering leadership and job satisfaction (JS) over the course of a decade (2011-2021).

JS a multifaceted construct reflecting an employee's contentment with their work, has gained prominence as a critical metric in organizational psychology. The quest to understand the antecedents of JS has led scholars to scrutinize the impact of leadership styles, particularly those encapsulating empowering attributes.

This meta-analysis employs a rigorous random effects model, acknowledging the inherent heterogeneity across diverse empirical studies conducted during the specified timeframe. By adopting a comprehensive approach, we endeavor to synthesize and distill the collective wisdom accumulated from a wide array of research endeavors.

Our scholarly endeavor is not merely confined to consolidating extant knowledge but is poised to offer a nuanced perspective on the evolving dynamics between EML and JS. As we navigate through the literature, we will scrutinize prevailing research trends, discern patterns, and address potential disparities in findings. The methodical exploration of empirical evidence aims to contribute substantively to the scholarly discourse and extend actionable insights to organizational practitioners.

This meta-analysis, as an intellectual pursuit, aspires to unravel the evolving tapestry of leadership dynamics within the contemporary organizational milieu. By uncovering the nuanced interplay between EML and JS, this study holds the potential to inform leadership development initiatives and guide strategic organizational interventions, ultimately fostering resilient and gratifying work environments.



Figure 1 - Relationship between Empowering Leadership and Job Satisfaction

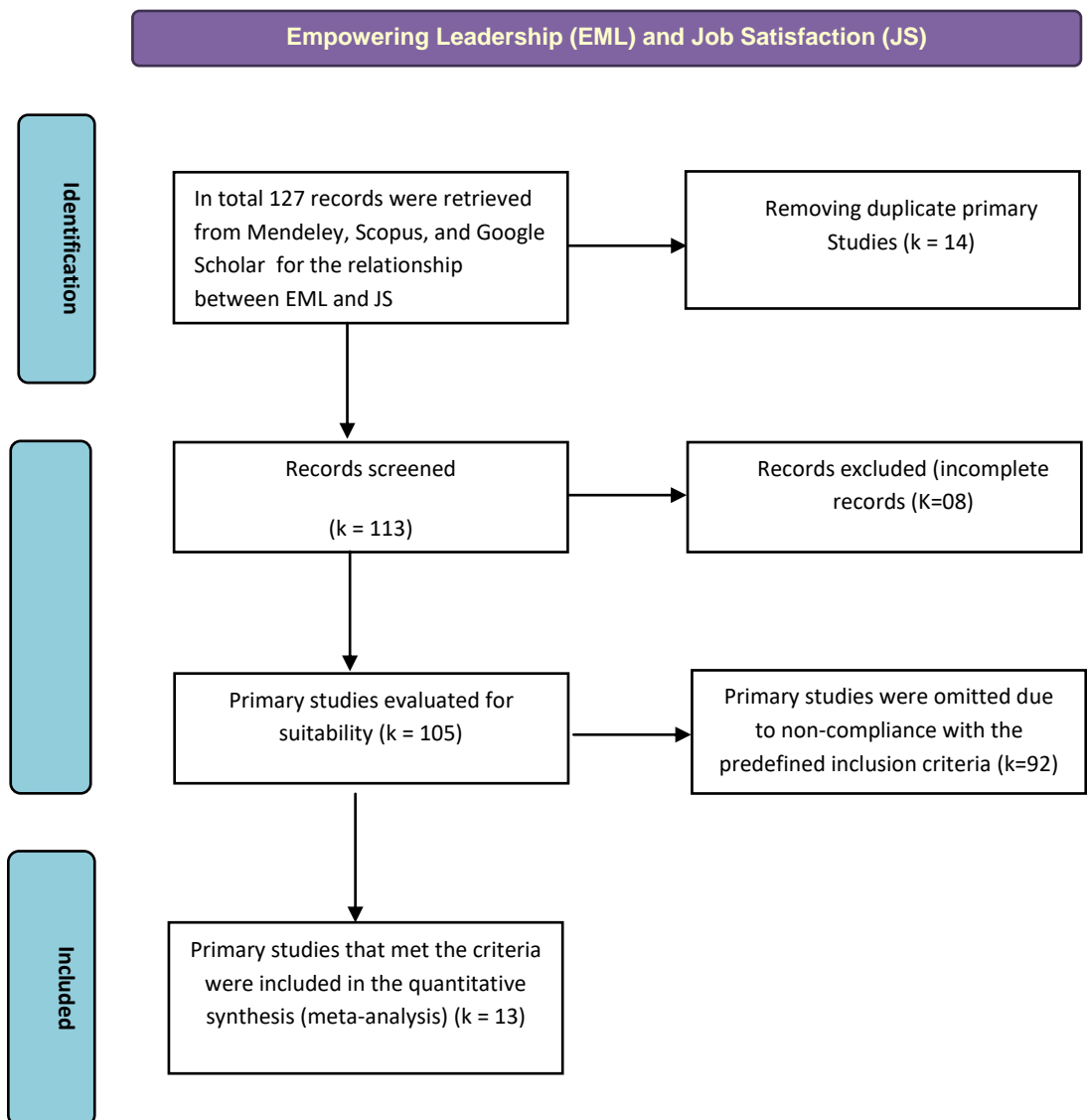
2. Literature Review:

In the pursuit of a meticulous meta-analysis, our methodology adhered rigorously to the PRISMA guidelines. Illustrated in Figure 2 is the systematic flow, encompassing identification, screening, and inclusion stages.

Beginning with a comprehensive search across Mendeley, Scopus, and Google Scholar, we amassed 127 records. After stringent screening, 113 records remained, with 8 non-full-text articles or theses excluded. Applying predefined criteria, 105 primary studies were evaluated, leading to the exclusion of 92 studies. Ultimately, 13 studies met our criteria and formed the basis for the meta-analysis.

This PRISMA-guided approach ensures transparency and reliability in the selection of primary studies, enhancing the credibility of our meta-analytical exploration into the relationship between EML and JS.

Figure 2 - PRISMA schematic for Meta-analysis



Note:k = Number of Studies,

Table 1 stands as an expansive repository, encapsulating the principal codes and input values meticulously derived from the 13 meticulously selected primary studies. The seamless

integration of these data points into our meta-analysis not only provides a consolidated overview of the diverse coding structures employed in the studies but also offers valuable insights into the key variables and parameters shaping the analytical framework. The precision and thoroughness in integrating these components contribute significantly to the robustness and depth of our meta-analytical exploration of the intricate relationship between EML and JS.

TABLE 1 – INTEGRATION OF CORE CODES AND INPUT VALUES FROM PRIMARY STUDIES INTO THE META-ANALYSIS

| Predictor Variable | Outcome Variable | Reference of Primary Studies | Participants | Country | Published | <i>n</i> | <i>r</i> | Scale Used for Predictor Variable | α of Predictor Variable | Scale Used for Outcome Variable | α of Outcome Variable |
|--------------------|------------------|-------------------------------|--------------|---------|-----------|----------|----------|-----------------------------------|--------------------------------|--|------------------------------|
| EML | JS | Martínez et al., (2021) | Employees | Spain | Yes | 566 | 0.69 | Arnold et al., (2000) | 0.97 | Burke & Dunlap, (2002) | 0.80 |
| EML | JS | Martínez et al., (2021) | Employees | Spain | Yes | 495 | 0.81 | Arnold et al., (2000) | 0.98 | Burke & Dunlap, (2002) | 0.77 |
| EML | JS | Martínez et al., (2021) | Employees | Spain | Yes | 617 | 0.73 | Arnold et al., (2000) | 0.98 | Burke & Dunlap, (2002) | 0.85 |
| EML | JS | Liu, Yang, & Huang, (2021) | Teachers | China | Yes | 557 | 0.34 | Zhao and Zhao, (2012) | 0.74 | Dolbier et al., (2005) single item scale | 0.75* |
| EML | JS | Bharadwaja & Tripathi, (2020) | Employees | India | Yes | 431 | 0.48 | Arnold et al., (2000) | 0.90 | Schnake, (1983) | 0.85 |
| EML | JS | Porkelsson, (2018) | Employees | Iceland | No | 127 | 0.22 | Lindström, (1997) | 0.67 | Single Item | 0.75* |
| EML | JS | Jønsson et al., (2016) | Employees | Denmark | Yes | 1,503 | 0.47 | Ahearne et al., (2005) | 0.92 | Wanous and Reicher, (1996) single item | 0.75* |
| EML | JS | Dahinten et al., (2016) | Nurses | Canada | Yes | 1,007 | 0.52 | Hui, (1994) | 0.96 | Mueller, (1990) | 0.91 |
| EML | JS | Amundsen & Martinsen, (2015) | Employees | Norway | Yes | 233 | 0.46 | Amundsen & Martinsen, (2014b) | 0.88 | Cammann et al., (1983) | 0.90 |
| EML | JS | Amundsen & Martinsen, (2015) | Employees | Norway | Yes | 161 | 0.40 | Amundsen & Martinsen, (2014b) | 0.97 | Cammann et al., (1983) | 0.84 |
| EML | JS | Ou et al., (2014) | Middle Level | China | Yes | 645 | 0.02 | Ahearne et al., (2005) | 0.88 | Bono & Judge, | 0.89 |

| | | | | | | | | | | | |
|-----|----|-------------------------------|-----------|--------|-----|----|-------|-------------------------------|------|------------------------|------|
| | | | Managers | | | | | | | (2003) | |
| EML | JS | Amundsen & Martinsen, (2014a) | Employees | Norway | Yes | 50 | -0.13 | Amundsen & Martinsen, (2014b) | 0.90 | Cammann et al., (1983) | 0.91 |
| EML | JS | Amundsen & Martinsen, (2014a) | Employees | Norway | Yes | 50 | 0.47 | Amundsen & Martinsen, (2014b) | 0.94 | Cammann et al., (1983) | 0.91 |

Note- EML = Empowering Leadership; JS = Job Satisfaction; n = Sample Size; r = Correlation; α = value of Cronbach’s alpha; α^* =Mean value of Cronbach’s alpha of other.

3. Method: We employed the Random Effects Model, which offers a robust and comprehensive perspective, as it assumes that the observed effects are drawn from a distribution of true effects, incorporating both systematic and random variations. This approach is particularly pertinent in the context of our study on the relationship between EML and JS, where diverse methodologies and contextual factors across the primary studies could influence the observed outcomes. By employing the Random Effects Model, we aim to provide a nuanced and reliable synthesis of the available evidence, contributing to a more comprehensive understanding of the complex interplay between EML and JS over the specified period

4. Results: The Galbraith plot, illustrated in Figure 3, provides a visual representation of the distribution of effect sizes across the 13 primary studies investigating the relationship between EML and JS. This graphical representation aids in identifying potential sources of heterogeneity within the dataset.

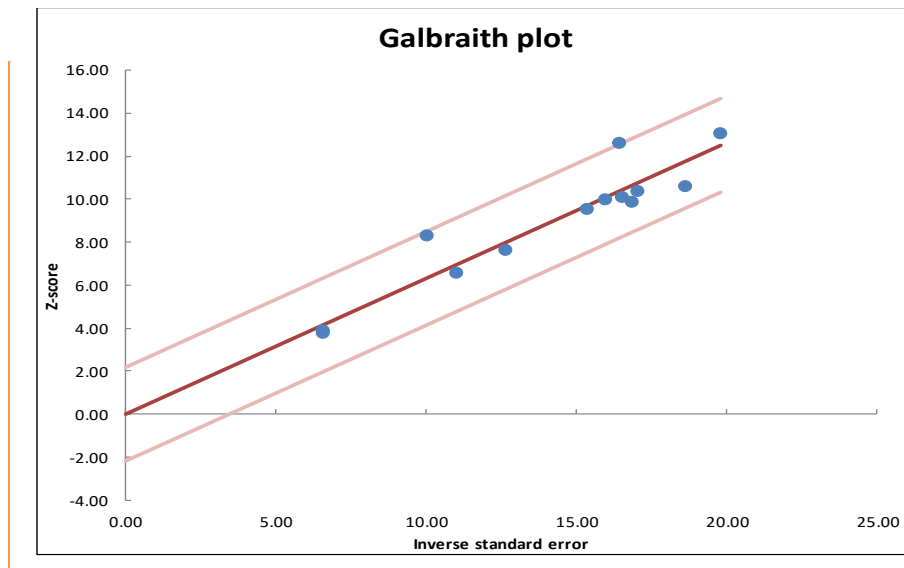


Figure 3- Galbraith plot in studies related to Empowering Leadership and Job Satisfaction, (k=13)

The observed effect size (r) of 0.46 indicates a moderate positive correlation between empowering leadership and job satisfaction. Further, $\rho_{+C} = 0.56$ show the correct effect size (r) Enhanced following the elimination of artifacts stemming from sampling and measurement

errors. The confidence intervals (CI_{LL} and CI_{UL}) Indicate the interval wherein the true effect size is anticipated to lie, with a 95% confidence level.

The Q-statistic and associated p-value (PQ) assess the homogeneity of effect sizes across studies. In this context, a Q-statistic of 22.53 with a p-value of 0.032 suggests significant heterogeneity. The I^2 statistic further quantifies this heterogeneity, indicating that approximately 46.75% of the variability in effect sizes can be attributed to true differences rather than chance.

To further assess the reliability of the findings, we conducted publication bias analyses using Egger's regression test and the Begg and Mazumdar test. The p-values derived from these tests, denoted as P_{ERT} and P_{BMT} in Table 2, are crucial indicators of potential bias in the included studies.

The P_{ERT} (Egger's regression test) resulted in a p-value of 0.85, indicating the absence of substantial publication bias. Similarly, the P_{BMT} (Begg and Mazumdar test) resulted in a p-value of 0.300, reinforcing the absence of substantial bias across the selected studies.

TABLE 2 - META-ANALYSIS RESULTS

| Variable | k | N | r | ρ_+ | ρ_{+C} | CI_{LL} | CI_{UL} | PI_{LL} | PI_{UL} | Q | P_Q | I^2 | P_{ERT} | P_{BMT} | $TFM\rho_{+C}$ | IS_{TFM} |
|----------|----|-------|------|----------|-------------|-----------|-----------|-----------|-----------|-------|-------|--------|-----------|-----------|----------------|------------|
| | 13 | 6,442 | 0.46 | 0.48 | 0.56 | 0.53 | 0.59 | 0.48 | 0.63 | 22.53 | 0.032 | 46.75% | 0.85 | 0.300 | 0.62 | 1 |

EML→JS

The value " $TFM\rho_{+C}$ " of 0.62, obtained through the Trim and Fill Method see Table 2, provides insights into the potential impact of publication bias on the meta-analytical results. In this context, $TFM\rho_{+C}$ refers to the adjusted estimate of the correlation between EML and JS, see Figure 4, after accounting for potential missing studies that may contribute to publication bias.

A value of 0.62 suggests that, after adjusting for potential publication bias using the Trim and Fill Method, the correlation between EML and JS remains robust. This adjusted estimate indicates a moderate positive correlation between empowering leadership and job satisfaction, even after accounting for potential missing studies that could introduce bias into the analysis.

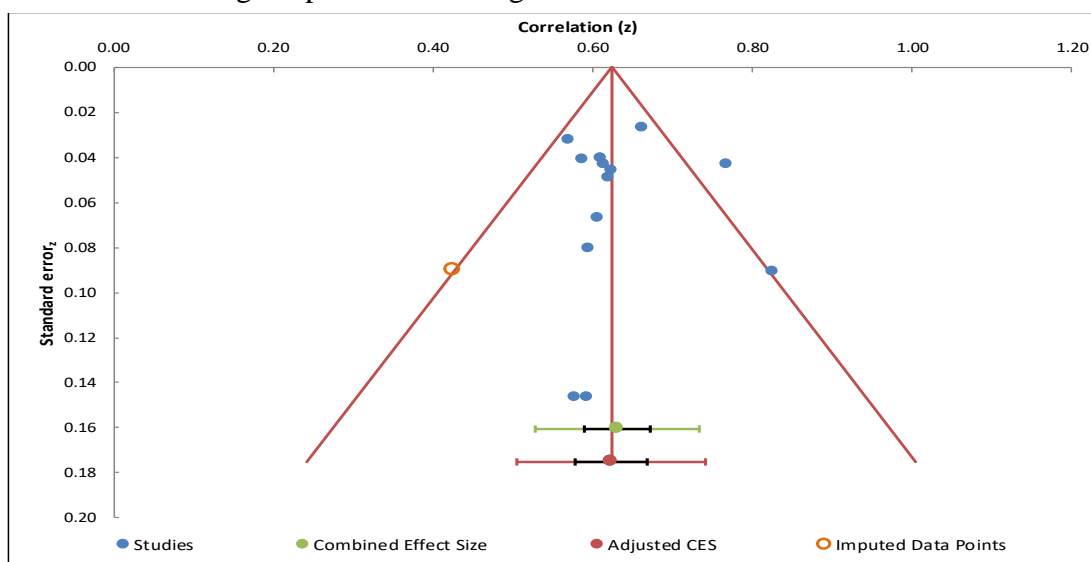


Figure 4 - Funnel plot in which trim and fill method applied in studies related to EML and JS, (k=13), (IS=01)

The negligible p-values from the publication bias analyses contribute to the robustness of our findings, indicating that the observed relationship is unlikely to be influenced by bias in the included studies. This comprehensive analysis enhances our confidence in the validity of the meta-analytical exploration into the complex interplay between EML and JS.

5. DISCUSSION:

Our meta-analysis unveils a statistically significant and moderately positive correlation between EML and JS. The Galbraith plot visually underscores the robustness of this relationship across the 13 primary studies. The observed effect size of 0.56 indicates a meaningful connection, portraying the positive impact of EML behaviors on employees' JS. The application of the Trim and Fill Method further enhances our confidence in the results, as the adjusted correlation ($TFM_{p+c} = 0.62$) remains substantial. These findings contribute substantively to the understanding of organizational dynamics, emphasizing the pivotal role of EML in fostering a positive and satisfying work environment. The identified correlation underscores the importance of cultivating EML practices as a means to enhance employee JS, ultimately promoting organizational success and employee well-being.

6. Future Recommendation:

In charting the trajectory for future research, a strategic blend of longitudinal studies, cross-cultural investigations, and exploration of mediating and moderating variables is imperative. Additionally, well-designed intervention studies could offer actionable insights for organizational leaders aiming to refine empowering leadership practices and elevate job satisfaction among their employees. This multifaceted approach not only aligns with the complexity of organizational dynamics but also underscores the commitment to advancing empirical knowledge in a manner that is both robust and practical.

7. CONCLUSION:

Delving into the heart of our research findings, a profound revelation emerges — a substantiated and impactful correlation between EML and JS. The Galbraith plot and effect size analysis lend empirical weight to this connection, affirming its significance. As we navigate the nuanced landscape of organizational leadership, these findings emerge as a beacon pointing towards a transformative outcome.

The best outcome of our research lies not merely in the statistical confirmation of a positive correlation but in its potential real-world implications. EML, as revealed by our analysis, is intricately linked to heightened JS among employees. This connection, fortified by the Trim and Fill Method's adjusted correlation ($TFM_{p+c} = 0.62$), transcends the realm of statistical observation and ventures into the territory of actionable insights.

For organizational leaders, these findings herald a strategic imperative — the recognition that fostering EML practices is not just a pathway to satisfied employees but a gateway to enhanced organizational success. This transformative outcome invites leaders to embrace EML as a catalyst for organizational prosperity, where employee satisfaction becomes the bedrock for sustained growth, innovation, and resilience. In essence, our research not only validates a correlation but beckons leaders to orchestrate a symphony of leadership practices that resonate with the harmonious flourishing of both employees and organizations.

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THE USE OF AMARANTH IN THE FOOD INDUSTRY AND FEED PRODUCTION BASED ON THE STUDY OF ITS CHEMICAL COMPOSITION

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ABSTRACT

By the method of natural selection, 4 local varieties of amaranth were developed based on more than 20 foreign varieties. It has been shown that the new varieties produce an ordinary green mass with a high index of amino acids. The results of the chemical analysis of the amaranth product are presented. A method of using amaranth juice as a food and effective additive to animal feed is proposed.

KEYWORDS: *Amaranth, Lysine, Amino Acids, Squalene, Trace Elements, Granules, Juice, Feed.*

INTRODUCTION

As you know, amaranth leaves and stems are rich in microelements such as potassium (611 mg), calcium (215 mg), magnesium (55 mg), sodium (20 mg) and phosphorus (50 mg) per 100g. It also contains trace elements: iron (2.32 mg), manganese (0.885 mg), copper (0.162 mg), selenium (0.9 mg) and zinc (0.9 mg). In addition to the above, amaranth leaves contain several vitamins A and B, as well as vitamins C, D, E, and K, and a whole range of amino acids and fatty acids. The green mass of amaranth is rich in proteins (28%), lipids (3.5%), carbohydrates (43%) and vitamins A, C, B, B1 and macro- and microelements. These data found good evidence when studying the chemical composition of Andijan varieties. Especially high protein levels were detected (up to 34%) [1,2].

The role of the essential amino acid Lysine in animal husbandry should be noted. Lysine is the limiting essential amino acid in the diet of farm animals. The requirement for lysine, depending on the age and life stage of the livestock, averages from 0.5% to 7.2%. Amino acid deficiency leads to disruption of protein metabolism and loss of productivity. To meet the needs of livestock, agricultural complexes use lysine preparations to enrich feed [3,4].

Lysine, which is part of proteins, is not synthesized by the body and comes with food, which the body requires to maintain normal hormonal levels and produce immune cells. Without regular replenishment of lysine reserves in the body, tissue growth and repair will slow down, bones and cartilage will lose strength, joints will lose mobility, blood vessels will weaken, and the level of enzymes and hormones will drop. A sufficient amount of Lysine in the feed dramatically increases the digestion of feed and thereby increases milk yield in cows and rapid weight gain in bulls. Lysine is especially necessary for young animals, accelerating high rates of development and growth [5].

Experimental Part

The object of the study is fresh silage, juice squeezed from green leaves and stems of amaranth, as well as various granules obtained from different varieties of amaranth grown in Andijan. High-protein animal feed has been developed and proposed for use in widespread production in the following stages:

Stage 1:

1. At the moment of ripeness of the amaranth grain, the upper part, the spike, of the plant is cut off, and then the seeds are separated from it.
2. The field is irrigated abundantly and the re-growth of amaranth colossi is ensured,
3. Mow the amaranth and massively press the green mass with an unripe ear and you will get high-protein juice.
4. Package juice for sale

Stage 2:

1. The remainder of the pressed masses is dried and prepared for granulation.
2. Wheat waste, rice chaff, salt and other impurities are added and granulated.
3. The final drying of the granules is carried out and packed in bags.
4. Transferred for storage or implementation.

Conducted Experiments

Amaranth is valued because it contains a large amount of natural lysine. On a livestock farm, we tested the palatability of various types of feed obtained from amaranth. It has been proven that amaranth silage and granules are readily eaten by animals. When feeding young animals with feed without the addition of artificial lysine supplements, a low growth rate is observed. Young animals fed with amaranth silages and the addition of amaranth juice to their diet show significant differences from traditional ones: good appetite, and rapid growth in young animals. Cows' milk yield increases and weight gain improves. We were convinced that with lysine deficiency, the growth of young animals slowed down. The daily norm of lysine for livestock is up to 5 grams. It has been proven that 190-300 grams of amaranth grass flour per day provides the life requirements of livestock.

Amaranth leaves and stems contain more than 80% moisture, which does not complicate the granulation process. When heated or dried in the sun, many useful components are destroyed. By pressing the green mass, all useful substances are preserved, and we obtain expensive juices and, most importantly, semi-dried mass, which is a valuable raw material for granulated feed. This mass is easy to dry and granulate.

Scientific Analysis of the Composition of the Resulting Product: Analysis of the composition of amaranth juice shows that all the chemical elements contained in the leaves are completely preserved in the juice liquid. This is thanks to the cold press. For this process, we used a screw press.

We have studied the composition of seed oil and juice from the leaves of the red amaranth variety "Andijan". The first results show that the oil contains valuable vitamins: D, E, C, and B

vitamins. In addition, it contains valuable plant proteins, minerals, and polyunsaturated fatty acids, as well as the antioxidant squalene ($C_{30}H_{50}$).

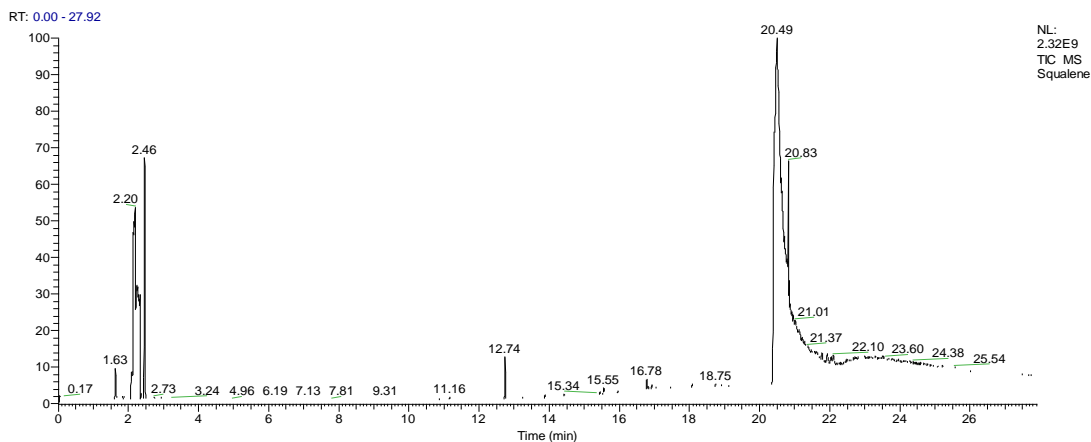


Fig. 1. Gas chromatogram of standard Squalene.

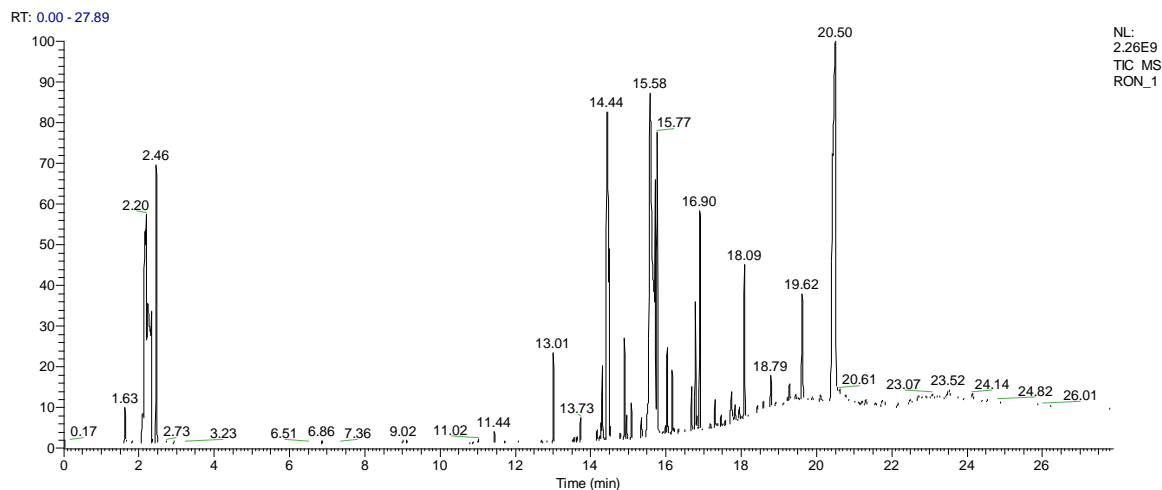


Fig. 2. Gas chromatogram of amaranth oil variety "Markhamat"

Comparison of Fig. 1 and 2 indicate that after 20 minutes of retention, the Squalene peaks for the standard and test products coincide. Valuable chemical minerals were found in the studied sample, such as $C_{17}H_{32}O$ -Cyclohexanecarboxylic acid, decyl ester (Cyclohexanecarboxylic acid, decyl ester), $C_{22}H_{43}NO$ -3-Docosenamide (3-Docosenamide), $C_{17}H_{32}O$ -Methyl-8-hexadecyn-1 (Methyl-8-hexadecyn-1), $C_{19}H_{36}O$ -2-Methyl -Z,Z-3,1 3-octadecadienol (2-Methyl-Z,Z-3,1 3-octadecadienol).

Future Plans: We plan to further determine the chemical composition of feed (pellets, juice, silage) in the context of these 4 varieties, depending on the soil and natural conditions. The second main task is to extend the shelf life of the resulting juices from amaranth.

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FAITH OF ROMANTIC CHARACTERS IN RELIGIOUS IDEAS IN THE WORKS OF CHATEAUBRIAND

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ABSTRACT

The article is written about the works of Chateaubriand and describes that he calls on religious beliefs to help his heroes who find themselves in difficult situations, inadequate, depressed, disappointed, and lost hope. The emotional and burning passions of the heroes of the novels "Atala" and "Rene" are analyzed.

KEYWORDS: *Genre, Novel, Prose, Religious Belief, Christianity, Objective, Subjective.*

INTRODUCTION

In the work of the great French writer Chateaubriand (François René de Chateaubriand, 1788-1848), his romantic ideas found expression in several works. These include the following works: "The Genius of Christianity" ("Génie du christianisme", 1802), "Atala or the loves of the two savages" ("Atala ou les amours des deux sauvages", 1801), "René or the effects of passions" ("René ou les effect des passions", 1802), "The martyrs" ("Les martyres", 1809)

The influence of Chateaubriand's work on French literature is enormous. It should be noted that his skill had a more significant and serious influence on lyric poetry than on the novel genre[5: 45]. Before Chateaubriand, Victor Hugo bowed deeply (remember his exclamation "Be as great as Chateaubriand, or no one!"), showed great respect. Charles Baudelaire called him "the great René or the great prose writer, the father of French romanticism." For A. S. Pushkin, Chateaubriand was "the first among French writers, the teacher of an entire generation devoted to writing." The great Russian poet and writer had an excellent command of the French language, so in his youth, he read Chateaubriand's works in the original[2: 322].

At the beginning of the 19th century, Chateaubriand's influence on French romantic literature was enormous; he was able to describe with great skill the form and content of a work of art and determined the further development of the literary movement in a diverse and colorful.

D. D. Oblomievsky, one of the Russian scientists who deeply studied the literature of the French movement of romanticism, based on the ideology of the Soviet era and the Marxist-Leninist doctrine of class struggle, sharply criticizes François Chateaubriand and his followers as reactionary romantics expressing fear of revolutions of the noble class. According to D. Oblomievsky, "reactionary romantics do not agree with the existing reality; despair and religious and mystical motives predominate in their works. The hero of their works is against all innovations brought by the revolution, against material (economic) development, and the principles of democracy. Egoism (egoism), fierce aristocracy, hatred of the people (ordinary people) are the characteristics of these heroes." [3: 85].

It is a historical fact that the first Christians, sung by F. Chateaubriand, had a strong faith in God and Jesus Christ, even though they lived in agony under the yoke of the Roman Empire. In general, in the Middle Ages, Christian poets wrote highly artistic, semi-legendary, semi-realistic works, and the literary heritage, folk art - folklore works served as a source for European romantic poets.

Another founder of French romanticism of this period was J. The heroes of Madame de Stael's works are great heroes who direct their nobility and strong aspirations to fight for the nation, society, homeland, and people, even if they face opposition, they consider death better than bowing down before oppressors, tyrants, and despots. By this, J. de Stael demonstrated his high appreciation of the great French Revolution and its heroes.

By creating the image of Atala, who has strong religious views and faith, in "Atala or the loves of the two savages" (Atala ou les amours des deux sauvages, 1801), Chateaubriand tries to describe the inner, extremely complex spiritual life. The human world, mixed with primitive views and beliefs, is like a conflict of emotions. Atala and Shakta's love ends tragically due to religious beliefs.

He was completely "born again." The Thoughtful priest Aubrey destroyed all sense of genius in the young man and turned him into an obedient religious youth who blindly believed in the teachings of the Church.

Such a fantastic idea about the powerlessness of man before the power of nature, the idea that the human mind must rely on religious ideas, found its vivid expression in Chateaubriand's second story "Rene". In "Rene" we again encounter the image of a young man, unable to realize his personality and predominantly given over to passions. Here we see that the author's main goal is to describe Rene's inner experiences and mood, his emotions and thoughts, dreams and memories. Nature, people, and things force the hero to think, reason, and draw conclusions. In this place, the hero's continuous journeys, his attempts to understand the meaning of life, and his desire to seek the truth of life, without ceasing to help. Rene is a very individualist, he lives only by his dreams, loves his sister Amelia very much, and is always thinking of having fun with her. According to F. Chateaubriand, this love is condemned in Christianity as immorality, a sin leading to hell.

The story "René" embodies the first hero of French romanticism, a hero who embodies all the symptoms of the "disease of the century" (*le mal du siècle*). He is occupied by strong feelings and passionate passions, he is alien and lonely, and he lives in exile and separation from his environment. Chateaubriand reveals the hero's romantic situation and describes it very clearly: "...un jeune homme sans force et sans vertu, qui trouve en lui-même son tourment, et ne peut guère se plaindre que des maux qu'il fait à lui-même [6: 149]. Meaning: A young man, fried in the oil of his misfortunes, suffering from his misdeeds, weak and devoid of good qualities. [Translation of U. Q.]

The value of inner life, complete immersion in one's own "I" - the spiritual world of man - is the organizing principle of the narrative in Rene, from which its apologetic form follows. The depicted world is illuminated through the lyrical "I" - the spiritual world of man. The artistic and ideological structure (poetic structure) of the work is based on two worlds, imbued with the spirit of romanticism: the spiritual principle (true existence) and the unacceptable existing reality.

The escape of the individual from the shackles of feudalism and the transition to the era of capitalist fragmentation was expressed in the tragedy of individualism in the characters of the works of that time. The critic Saint-Bov called this problem the central idea of the novel “Rene” and wrote in the preface to the next edition of the work: “Rene’s pain is the pain of that time” [7: 10] expressed his opinion. This idea attracted the attention of many writers, such as George Sand, Lamartine, Goethe, Hugo, and Balzac.

The first direct expression of the two worlds, naturally, is the antithesis, which permeates the entire narrative, the thoughts and opinions of the hero, or the actions and behavior. Most often, the sentence structure in the text is organized based on this basic rule: *“Cependant qu’avais-je appris jusqu’alors avec tant de fatigue? Rien de certain parmi les anciens, rien de beau parmi les modernes. Le passé et le présent sont deux statues incomplètes: l’une a été retirée toute mutilée du débris des âges; l’autre n’a pas encore reçu sa perfection de l’avenir [6: 154];*

Meaning: However, what had I learned until then with such effort? Nothing certain among the ancients, nothing beautiful among the moderns. The past and the present are two incomplete statues: one was removed all mutilated from the debris of the ages; the other has not yet received its perfection from the future [Translation of U. Q.].

The problem of two worlds is closely related to such a beautiful feature of romantic prose - poetic mood. We are not talking about poems written in prose, but about a kind of poetic beginning based on the narrative in the works of N.V. Gogol. A.V. Chicherin calls it “a subtle and simple combination of wonderfully found verse and prose.” “The fact is,” writes the scientist, “that “Terrible Revenge” is a poem in the spirit of romanticism, and the strength of its language is a subtle and simple combination of verse and prose. This prose music far exceeds the level of music intended for literary prose. In “A Terrible Vengeance” prose does not turn into poetry; here is something completely different: natural, primordial, their unity; this unity was not achieved by Marlinsky and Veltman, but it was achieved by Chateaubriand and Hugo.” [4: 123].

“Cette froide fermeté qu’on opposait à l’ardeur de mon amitié, me jeta dans de violents transports. Tantôt j’étais près de retourner sur mes pas; tantôt je voulais rester, uniquement pour troubler le sacrifice (6: 168);

Meaning: “This cold firmness which was opposed to the ardor of my friendship threw me into violent transports. Sometimes I was about to retrace my steps; sometimes I wanted to stay, only to disturb the sacrifice [Translation of U. Q.].

La tempête sur les flots, le calme de ta retraite; des homes brisés sur des écueils, au pied de l’asile que rien ne peut troubler; l’infini de l’autre côté du mur d’une cellule; les fanoux agités des vaisseaux le phare immobile du couvent... [6: 173].

Meaning: The storm on the waves, the calm of your retreat; broken men on reefs, at the foot of the asylum that nothing can disturb; infinity on the other side of a cell wall; the agitated lanterns of the ships the motionless lighthouse of the convent [Translation of U. Q.].

Frankly explicit, that is, explaining conventional signs, the entire text, except the explanatory sign, in each specific place is, as it were, divided into two parts. Here, every structure or component, any element appears in two dimensions.

External and internal objective existence is described through the subjective perception of the hero. For example, in the bright (figurative) language of Chateaubriand, in his “phrases” and

“sentences,” the French scientist R. Andrieu sees a search for refuge, and the writer interprets this as the writer’s disappointment in history, the return of his sincerity, his loss, his lost. R. Andrieu writes: “Atala”, “Rene” or “The Genius of Christianity”, be that as it may, are still associated with phrases and sentences, that is, associated with political exoticism, rejection of reality, a departure from it, retreat before the onslaught stories [1: 38].

It should be noted that in his works Chateaubriand skillfully reveals the spiritual experiences of a person, the subjective world, that is, the second “I”. In the case of his characters, he creates a person who can give up his world and dreams due to religious views. They suppress their inner rebellion through religious beliefs. Two-world, spiritual situations in the destinies of the heroes of the work cause contradictions in their lives.

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MAIN CATEGORIES OF SMALL BUSINESS AREAS IN THE REPUBLIC OF UZBEKISTAN

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ABSTRACT

The article explores theoretical and methodological aspects related to the establishment, structure, and investigation of entrepreneurship, entrepreneurial endeavors, and entrepreneurial entities. This includes a contrast between classical and contemporary understandings of entrepreneurship. The article aims to depict the increasing significance of entrepreneurs as key figures in entrepreneurial activities throughout the historical and economic evolution of society. Additionally, it delves into the legislative and regulatory framework, as well as the fundamental concepts within the realm of small businesses in the Republic of Uzbekistan.

KEYWORDS: *Small Business, Entrepreneurship, Entrepreneur, Joint Stock Company, Limited Liability Company, Individual Entrepreneurship.*

INTRODUCTION

In a market-oriented economy, the synthesis of production factors for the creation of goods and services primarily occurs through entrepreneurial activity. While entrepreneurial activity shares proximity with factors like labor, it is distinctly identified as an independent production factor in the market system due to its unique significance. The market economy is often referred to as the «economy of free enterprise, «where free enterprise stands out as a defining characteristic. Entrepreneurs globally assume a pivotal role, with their activity, personal drive, and capital, coupled with their organizational skills in orchestrating work and coordinating group efforts, contributing significantly to the augmentation of social wealth. Exploring the theoretical foundations of entrepreneurship holds paramount importance in the context of the development of small businesses in the Republic of Uzbekistan. This category actively contributes to the advancement of a market economy, fostering competition, and promoting the liberalization of foreign economic activities. The terminological essence and conceptual content of the term «entrepreneurship» have undergone changes and refinement over the course of the evolution of economic science.

Significance of the Research Topic The theoretical and methodological foundation of this study draws upon the perspectives of eminent scholars and economists, including R. Cantillon, J. Say, A. Marshall, J. Schumpeter, F. Braudel, S. Brew, D. Lindsay, and others, who have contributed to the understanding of small business development. Noteworthy among the extensive body of research on various aspects of small business are works by A.I. Ageev, A.G. Aganbegyan, A.V. Busygin, A.G. Bragina, N.N. Bokareva, A.P. Bunich, V.Yu. Burov, O.V. Butorina, M.V. Vasiliev, I.P. Vlasov, V.V. Glinsky, V.M. Diyarkhanov, A.M. Ermoshin, A.A. Zhuk, O.Y. Zaslavskaya, R.Ya. Ivasyuk, S.P. Peregudov, E.M. Primakov, V.N. Salnikova, P.P. Sidorchuk, A.N. Spartak, I.V. Rozhkov, A.A. Stukalo, A.Yu. Chepurenskiy, A.Yu. Yudanov, A.M.

Shestoperov, N.P. Shmelev, R.V. Yakutkin, V.V. Radaev, Yu.M. Osipov, M.G. Lapusta, A.G. Porshnev, among others.

Of particular interest is the perspective of Russian economist A. V. Busygin, who posits that entrepreneurship is essentially the art of conducting business-it is, above all, a cognitive process materialized in the form of business design. In the professional realm, Busygin views entrepreneurship as the capacity to organize one's own business and effectively fulfill functions associated with its management (2001).

Research conducted by K.Abdurakhmanov, B. Islamov, A.V. Vakhabov, S. Gulyamov, A. Khikmatov, B. Berkinov, N. Makhmudov, V. Baturina, N. Muminov, M. Tursunkhodjaev, A. Ulmasov, Z. Khudaiberdyev, M. Khaydarov, and Sh. Yuldashev has been dedicated to exploring the nuances of entrepreneurship formation and development in Uzbekistan, among other topics.

In his article, M.I. Abidov emphasizes, «It is particularly noteworthy that in recent years, small businesses and private entrepreneurship have emerged as the primary sources for generating new jobs in the real sector of the economy» (2016).

According to Kulmetov M.R., «Small business has evolved into a crucial factor for economic development in our country» (2018).

However, the essential categories within the realm of small business in the Republic of Uzbekistan remain insufficiently examined. This circumstance underscores the relevance of the current study, indicating its scientific and practical significance.

In his famous work, «An Inquiry into the Nature and Causes of the Wealth of Nations», the distinguished English economist Adam Smith delved into the attributes of an entrepreneur. According to A. Smith, an entrepreneur, as the possessor of capital, assumes risks in pursuit of realizing a specific commercial concept and gaining a profit, as capital investments in any business inherently involve an element of uncertainty.

Entrepreneurial profit serves as the owner's recompense for undertaking such risks. The entrepreneur actively engages in planning, organizing production, leveraging the advantages of division of labor, and overseeing the outcomes of production activities (2020).

The theory of entrepreneurship received a significant contribution from the French economist J.B. Say, who, in his works such as «Treatise on Political Economy»(1803) and «Complete Course of Political Economy» (1828), attributed a crucial role to the entrepreneur. J. B. Say defined an entrepreneur as someone who «undertakes, at his own expense and at his own risk and in his own favor, to produce some product that satisfies his selfish interests». He categorized entrepreneurs as farmers-landowners, manufacturers (industrialists), and merchants, emphasizing their role as intermediaries between various producers and between producers and consumers. According to him, entrepreneurs govern production activities, leveraging knowledge and capital, and benefiting from both known and unknown conditions of production (2020).

J.B. Say believed that entrepreneurs perform a rational coordination of production factors-land, capital, and labor-and the level of profit depends on the effectiveness of entrepreneurial activity. In his view, entrepreneurial activity constitutes the fourth factor determining the economic efficiency of production. A. Marshall, the founder of the neoclassical direction of economic science, shared his perspective on entrepreneurship in his treatise «Principles of Economics» (1890) while exploring societal and economic development (2020), Marshall underscored the

increasing importance of entrepreneurs in the modern world, portraying them as individuals steering the vast industrial mechanism. He emphasized that private entrepreneurs, as key decision-makers, hold the threads of capital owners' and workers' interests with a firm grip (2021).

According to A. Marshall, the new generation of entrepreneurs primarily comprised those who independently built their fortunes—individuals characterized by strength, determination, and enterprise. These entrepreneurs were distinguished by their ability to make sound decisions, efficiency, resourcefulness, caution, and perseverance in pursuing their goals.

A new phase in comprehending the theory of entrepreneurship commences with J. A. Schumpeter, as elucidated in his renowned works «Theory of Economic Development» (1912) and «Capitalism, Socialism and Democracy» (1942). According to J. A. Schumpeter, entrepreneurial activity serves as the driving force and catalyst for all economic changes. He asserts that the function of entrepreneurs is to reform or revolutionize production by utilizing inventions or, more broadly, employing innovative technological solutions to create novel goods or produce existing goods in a new manner. This process involves opening up fresh markets, establishing new sources of raw materials or markets, and restructuring industries, among other aspects. The scientist contends that it is the entrepreneur, functioning as an economic entity, who, through the implementation of innovations in their economic endeavors, profoundly influences the nature and pace of economic system development (2020).

The American economist and founder of the Chicago School of Economic Theory, Frank Hahneman Knight, proposed a perspective distinct from J. A. Schumpeter, viewing entrepreneurship through the lens of risk. In his work «Risk, Uncertainty, and Profit» (1921), Knight distinguished between economic risk and uncertainty. He argued that each entrepreneurial situation is unique, characterized by uncertainty, and decisions in business are so singular that they cannot be statistically grouped to determine the approximate probability of a specific outcome. According to Knight, true uncertainty shapes the distinctive «enterprise» nature of an economic organization and explains the specific income earned by entrepreneurs. Thus, entrepreneurship, as outlined by Knight, involves economic entities receiving entrepreneurial income for their abilities and adept decision-making in conditions of uncertainty.

In contrast, J.M. Keynes, in his work «The General Theory of Employment, Interest, and Money» (1936), did not directly delve into the theory of entrepreneurship but presented his own characteristics of entrepreneurs. Keynes believed that entrepreneurs must possess a «spirit of life», a belief in their own success, abilities, and the future of their business. He argued that entrepreneurship, grounded in optimism about the future, benefits society as a whole, emphasizing that private initiative thrives best when rational calculations are complemented and supported by a spirit of cheerfulness, which he referred to as «animal spirits» (2021).

A renewed interest in the theory of entrepreneurship was sparked by the works of representatives from the modern Austrian school. L. von Mises, a notable figure in this school, defined entrepreneurship in his work «Human Action: A Treatise on Economic Theory» (1940) as a human activity viewed exclusively from the perspective of uncertainty. According to von Mises, the pursuit of profit by entrepreneurs serves as the driving force of a market economy (2021).

| Author | Definition |
|------------------------------|---|
| A. Tsyganov (2008) | «A small enterprise stands as an autonomous and quintessential participant in economic affairs, possessing distinctive attributes, characteristics, as well as both advantages and disadvantages». |
| D.Rechmn andM. Neskon (2007) | «A small enterprise can be described as a business overseen byan independent owner, lacking dominance in its industry, and adhering to specific criteria regarding the number of employees and production volumes». |
| A. Azriliyan (2007) | «Small business is the recognized term for a collection of small and medium-sized private enterprises that do not belong to any monopolistic association and play a subordinate role in the economy in comparison to monopolies». |

Table1. Conceptsof small business from the point of view of various authors

The concept of entrepreneurial activity in the Republic of Uzbekistan is secured in various legal documents, including the Constitution of the Republic of Uzbekistan and the Civil Code. According to Article 53 of the Constitution, the state guarantees freedom of economic activity, entrepreneurship, and labor, emphasizing the priority of consumer rights, equality, and legal protection of all forms of ownership.

The Law of the Republic of Uzbekistan «On Guarantees of Freedom of Entrepreneurial Activity (new edition)», dated May 2, 2012, the law of the Republic of UzbekistanNo.328, defines entrepreneurial activity as an initiative carried out by business entities in accordance with the legislation, aiming to generate income (profit) at their own risk and under their property responsibility.

While the economic theory of «entrepreneurship» is well-developed in scientific literature, the concept of "small business" is still undergoing study and systematization. Various scientists offer their definitions of a small enterprise and small entrepreneurship. Worldwide, different criteria, such as the number of employees, authorized capital, asset size, and turnover volume, are commonly used to classify business entities as small businesses.

According to Article 22 of the new Tax Code, adopted in accordance with the Law of the Republic of Uzbekistan No.599 from December 30, 2019, which introduced amendments to the Tax Code, «micro-firms and small enterprises» are legal entities subject to specific criteria related to the number of employees.

Pursuant to the Law of the Republic of Uzbekistan No.328«On Amendments and Additions to the Law of the Republic of Uzbekistan On Guarantees of Freedom of Entrepreneurial Activity», dated May 2, 2012, , and Resolution No.275 of the Cabinet of Ministers of the Republic of Uzbekistan, dated August 24, 2016, «On measures for transitioning to the International system of classification of economic activities», the sole criteria for identifying a small enterprise are its ICEA (International Classification of Economic Activities) and average annual workforce.

These regulatory documents specify that small businesses in the Republic of Uzbekistan encompass entities meeting certain criteria, as outlined in figure 2:

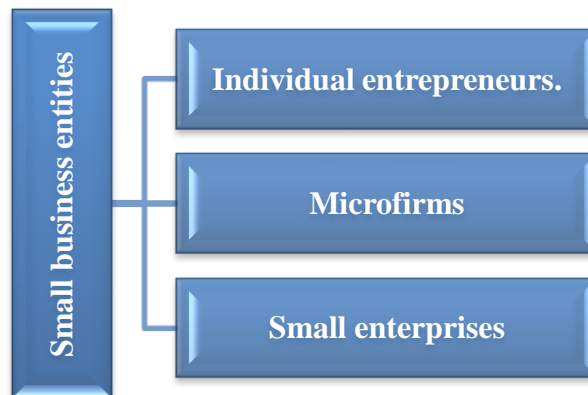


Figure-2. International classification of small businesses

1. An individual entrepreneur, also known as a sole proprietor, is a person who owns and operates a business independently. In this business structure, there is no legal separation between the individual and the business entity, and the entrepreneur assumes full responsibility for the business's operations and financial obligations.

2. Microfirms with an average annual number of employees employed in industrial sectors - no more than 20 people, in the service sector and other non-industrial sectors - no more than 10 people, in wholesale, retail trade and public catering - no more than 5 people.

3. Small enterprises with an average annual number of employees employed in the following industries:

- Light industry, food industry and construction materials industry provided for by the legislation - no more than 200 people;
- Metalworking and instrument making, woodworking, furniture industry, as well as other industrial and production areas provided for by the legislation - no more than 100 people;
- Mechanical engineering, metallurgy, fuel and energy and chemical industry, production and processing of agricultural products construction and other industrial and industrial areas provided for by the legislation - no more than 50 people;

Science, scientific services, transport, communications, сферы services (except for insurance companies), trade and public catering and other non-industrial areas - no more than 25 people.

In foreign literature, the term «small business» typically encompasses small and medium-sized enterprises. European countries and Japan commonly use the term «small and medium-sized enterprises». «In international statistics, there is a consistent practice of delineating the sector of small and medium-sized enterprises (SMEs).» The legislation of the Republic of Uzbekistan officially adopts the term «small business and private entrepreneurship».

«There is a need to draft legislation titled 'On Small and Medium-sized Businesses, outlining criteria for these enterprises and proposing incentive mechanisms for their stakeholders. On September 11, 2020, a video conference chaired by President Shavkat Mirziyoyev was convened

to discuss the further development of small businesses and private entrepreneurship, along with ensuring guaranteed revenue contributions to the state budget. During the session, it was emphasized that many countries categorize business entities into three groups (small, medium, and large), and each category receives distinct state support. However, it was noted that Uzbekistan currently lacks a comprehensive concept for medium-sized businesses, a sector that holds particular significance in economic development» (2020).

In the Republic of Uzbekistan, small businesses have the flexibility to adopt various organizational and legal forms and operate across diverse sectors. As outlined in Article 6 of the Law of the Republic of Uzbekistan «On Guarantees of Freedom of Entrepreneurial Activity,» individual entrepreneurship involves an individual engaging in entrepreneurial activities without establishing a legal entity, referred to as an individual entrepreneur. According to Article 24 of the Civil Code of the Republic of Uzbekistan, citizens gain the right to undertake entrepreneurial activities upon state registration as individual entrepreneurs.

Individual entrepreneurship is conducted independently by the individual entrepreneur, who is not authorized to hire employees. It is based on property owned outright or under other property rights allowing possession and/or use. This model excludes hired workers and permits various forms of business interaction, such as family entrepreneurship (conducted by spouses), simple partnerships, and «dehkan» economy (farm). Notably, Presidential Decree No.UP-4725, dated May 15, 2015, «On Measures to Ensure Reliable Protection of Private Property, Small Businesses, and Private Entrepreneurship, and Remove Barriers to Their Accelerated Development,» grants individual entrepreneurs the right to hire one to three employees, depending on the type of activity, starting from July 1, 2015. Appendix No.1 to Resolution No.219 of the Cabinet of Ministers of the Republic of Uzbekistan, dated July 31, 2015, «Regulations on the Procedure for Individual Entrepreneurs to Carry Out Entrepreneurial Activities with Hiring Employees,» specifies the types of activities in which an individual entrepreneur can engage.

The decree titled «On measures to simplify state regulation of entrepreneurship and self-employment» stipulates an expansion of the list of activities, works, and services that self-employed individuals can undertake, effective from July 1, 2020. Simultaneously, a new procedure is introduced, maintaining the restriction that self-employed individuals are not permitted to attract employees or function as employers. In Uzbekistan, conducting business through the establishment of a legal entity constitutes the primary form of entrepreneurship.

In accordance with Article 39 of the Civil Code of the Republic of Uzbekistan, a legal entity is an organization with separate property ownership, economic or operational management, accountable for obligations using its property. It has the ability to acquire and exercise property and personal non-property rights, assume obligations, and act as a plaintiff or defendant in court. The forms of legal entities, as defined by the Civil Code of the Republic of Uzbekistan, include business partnerships, companies, production cooperatives, unitary enterprises, and any other forms established by legislative acts (Part 2 of Article 40 of the Civil Code of the Republic of Uzbekistan).

A joint-stock company, defined as a commercial organization with authorized capital divided into shares certifying shareholders' rights, underwent amendments with the enactment of the Law of the Republic of Uzbekistan the law of the Republic of Uzbekistan No.531 on March 20, 2019. The amendments, part of additional measures to enhance the business climate, eliminated the

mandatory share requirement for foreign investors (at least 15%) in a joint-stock company. Additionally, shareholders owning voting shares gained a pre-emptive right to purchase shares or equity securities converted into shares and paid for in cash during placements. The decision on selecting an audit firm, determining the maximum payment for its services, and entering into or terminating a contract with it is now made by the general meeting of shareholders, with the Supervisory Board retaining this authority only for initiative audits. It is noteworthy that, previously, the authorized capital of joint-stock companies, limited and additional liability companies, business partnerships, and family enterprises had to meet a legislatively established minimum, and this requirement is no longer applicable.

Initially, this served as a hindrance to the growth of businesses, particularly those with minimal initial investments, such as consulting services. Simultaneously, disparities existed in various regulatory acts, creating inconsistencies in legal requirements. For instance, the law stipulated a minimum authorized capital of 400 thousand USD for a joint-stock company in Uzbekistan, while initial bylaws established it at 1,600 million UZS. Subsequently, a decision was made to reduce it to 400 million UZS, resulting in regulatory confusion. The recent amendments have effectively addressed these issues by allowing founders to freely determine the authorized capital without imposing any lower limits.

A limited liability company stands out as one of the prevalent organizational and legal forms, compulsory for the registration of a legal entity. Defined as a business company established by one or more individuals, its authorized capital is divided into shares specified in the constituent documents. Participants of a limited liability company bear no personal liability for its obligations and assume the risk of losses associated with the company's activities within the limits of their deposits. The Law «On Limited and Additional Liability Companies» No.310-II of December 6, 2001, explicitly sets the upper limit for participants at not exceeding fifty individuals.

Conversely, an additional liability company represents a less common form of entrepreneurship, where participants hold responsibility for the company's activities with their personal property.

In conclusion, after examining various perspectives on defining entrepreneurship, we propose an optimal definition:

«Entrepreneurship represents a key element of contemporary market dynamics, driven by the primary objective of maximizing profit through independent endeavors, catering to the market's demand for high-quality goods and services, while carefully considering the element of risk». Small business, on the other hand, constitutes an independent initiative, conducted at one's own risk and with personal property responsibility to achieve profitability. The entities engaging in small business activities are identified based on criteria such as the number of employees, authorized capital size, asset magnitude, turnover volume, among others. It is noteworthy that in the Republic of Uzbekistan, small businesses can be established in diverse organizational and legal forms across a broad spectrum of entrepreneurial sectors.

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SILVER NANOPARTICLES DERIVED FROM BARK EXTRACT OF BUTEA MONOSPERMA TO DETECT ANTI-ULCER ACTIVITY IN SWISS ALBINO RATS

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ABSTRACT

The anti-ulcer activity of Butea monosperma silver nanoparticles (SNBM) was estimated in Swiss albino rats using ulcers caused by histamine, drugs, and ethanol. The effects of the SNBM at the doses of 300 and 550 mg/kg per os (p.o.) were compared with those of the reference pharmaceuticals, famotidine (35 mg/kg b.w.), and revealed substantial safeguards against ulcers generated by indomethacin and histamine. Additionally, the extract demonstrated excellent resistance against stomach ulcers brought on by ethanol. In addition, in ethanol-induced stomach ulceration, SNBM drastically lowered the spike in lipid peroxide level [(Thiobarbituric acid reactive substances (TBARS))] and restored the altered glutathione level. According to the study, SNBM demonstrates anti-ulcer efficacy by enhancing the gastric mucosa's antioxidant capacity and minimizing mucosal damage.

KEYWORDS: Silver Nanoparticles; Butea Monosperma; Anti-Ulcer Activity.

INTRODUCTION

Butea monosperma (Lam) Taub (*Butea frondosa*) forest flame commonly known as Palash is a traditionally used medicinal plant, distributed in tropical and subtropical parts of the Indian subcontinents and Southeast Asia. It is a small-sized dry season deciduous tree up to a height of 15 m tall with a crooked trunk, and irregular branches with clothed shoots with grey or brown pubescence. The seeds, bark, flowers, leaves, and gum all have medicinal properties. Gum is an external astringent; leaves are diuretic and have aphrodisiac properties. Seeds are purgative, ophthalmic, anti-helminthic, rubefacient, depurative, and tonic, useful in herpes, skin disease, ringworm, arthritis, and diabetes. Bark extract displays significant antimicrobial activities (1). It also shows antifungal, anti-inflammatory, hypoglycaemic, and anthelmintic properties (2). The

key elements of plants are butrin, flavonoids, steroids, glycosides, and aromatic chemicals. The current research investigation has been underway with an aim of discovering the therapeutic qualities along with assessing the anti-ulcer activity of SNBM in several models in Swiss albino rats.

Ulcers are triggered because of the difference between aggressive and defensive factors of the gastric mucosa (3). The offensive factors are pepsin and gastric acid whose proteolytic effect is buffered by mucin secretion, mucosal glycoprotein, cell shedding, cell proliferation, and prostaglandins (4). The secretion of stomach acid is inhibited by a variety of medicinal drugs, including plant extracts, which are also used to boost the mucosal defense system by either enhancing the creation of mucus, which protects the surface epithelial cells or by interfering with the PG synthesis (5). Different chemical substances can cause gastrointestinal damage (6). Gastrointestinal lesions are linked to lipid peroxidation and oxygen-derived free radicals (7). Antioxidants stop the development of lesions brought on by different ulcerogenesis (8).

Measurements of gastro-protective behavior have been performed using ethanol-induced gastric ulcers extensively. By lowering endogenous glutathione and prostaglandin levels, reducing gastric mucosal blood flow, developing less mucus in the stomach, increasing ischemia, gastric vascular permeability, acid "back diffusion," histamine release, sodium and potassium efflux, calcium influx, free radical generation, and leukotriene production, ethanol results in ulcers (9). Investigations demonstrate that oxygen-derived free radicals have a significance in both acute and chronic ulceration, and neutralizing these radicals can have an important influence on the process of wound healing. Free radicals generated via ethanol elevate lipid peroxide levels and reduce cysteine, which requires amino acids to synthesize glutathione, which lowers glutathione levels (10). The gastrointestinal mucosa of rats (11) and humans both have substantial amounts of reduced glutathione. This glutathione serves as crucial to retaining the integrity of the mucosa; when glutathione levels in the gastric mucosa are low, mucosal ulceration develops (12). In comparison to control animals, oral administration of ethanol results in significantly higher levels of lipid peroxide, severe gastrointestinal injury, and Thio-barbituric acid reactive substance (TBARS). The gastrointestinal mucosa's glutathione content dropped (13). When compared to the animals that were not given any kind of therapy, the EEBM considerably decreased the elevated level of lipid peroxide and normalized the modified glutathione level. It's speculated that EEBM's antioxidant action is what causes it to safeguard against ethanol-induced stomach damage (14). An earlier study claimed that certain *Butea* species had anti-ulcer characteristics (15). Gallic acid and ellagic acid were found in this therapeutic plant after phytochemical analysis (16). Ellagic acid and gallic acid were identified as the key elements of the EETP by TLC and HPTLC (phytochemical analysis). A polyphenol that is commonly found, ellagic acid A, has been researched and reported to have excellent anti-inflammatory qualities (17). It also significantly reduces the production of stomach lesions associated with stress and suppresses acid secretion. Its ability to lower the activity of H^+ and K^+ ATPase could assist in explaining this action (18).

Materials and Methods

The Plant

Butea monosperma bark was collected in March 2022 from Gondia District of Maharashtra, India. The bark was identified by Herbarium specimens kept in the Department of Botany, Dhote Bandhu Science College, Gondia affiliated to Rashtrasant Tukadoji Maharaj Nagpur University,

Nagpur, A voucher specimen (BM/HS/DBSC/12.03.2022-4) is preserved there for future reference. To get rid of any contaminants, the collected material was thoroughly cleaned under running tap water and then rinsed with triple distilled water. It was then allowed to air-dry before being chopped using an electrical grinder into a fine powder for use in the experiments. This yielded a consistent mixture. To achieve an around 1.2 percent (W/W) concentrated extract, 0.29 grams of this combination were added to a 100 mL beaker and soaked in triple distilled water. This extract acquired a vivid orange color after it was filtered using Whatman filter paper No. 42 and allowed to stand for 24 hours. The extract was kept cold to facilitate further testing. Every substance utilized in the examination was as pure as could be found. Potassium bromide (KBr) came from Sigma, while analytical reagent-grade silver nitrate (AgNO₃) was shipped from Mumbai, India. The laboratory itself produced the triple-distilled water that was used in the synthesis procedure.

Preparation of the extract and synthesis of AgNPs (silver nanoparticles).

The sample underwent extraction using 90% ethanol employing a Soxhlet extraction apparatus, and subsequently, the solvent was completely evaporated under pressure to produce a semi-solid mass with an approximate yield of 7.5%. Through qualitative analysis, which demonstrated the presence of flavonoids, tannins, and steroids (19), and thin-layer chromatography with real markers, the chemical constituents of the extract were determined.

Additionally, to fabricate silver nanoparticles, the extract (1 mL) was combined with 6 mL of a 1mM AgNO₃ solution prepared in water at room temperature. This mixture was then stored in darkness for 24 hours. After 14 hours, a solution with a brown-yellowish hue was obtained, confirming the creation of silver nanoparticles (AgNPs). This formation was verified through Ultraviolet-visible spectroscopy (UV-Vis) studies. The purified AgNPs were collected after repeated washing of concentrated slurry. The collected AgNPs were then air-dried and kept in the refrigerator. A weighed amount of about 0.025% was kept in the carboxy methyl cellulose (CMC) before administering doses.

Animals

Swiss albino rats of either sex, weighing 180-200 g, were first fed a traditional pellet diet and free access to water before being subjected to additional research.

Gastric ulcers produced by indomethacin (20).

The test rats were kept on a 12-hour water fast and an 18-hour fast. ho were split up into four groups (n = 6). Group 1 served as the vehicle control and had its CMC delayed by 0.025%. The reference medication, famotidine, was delivered to Group 2 (35 mg/kg p.o. [mg of a drug per kg of (patient's body mass)/pediatric dose]). Silver nanoparticles from *Butea monosperma* (SNBM) were given to Group 3 and Group 4 animals one hour before the indomethacin administration (20 mg/kg p.o.) at doses of 300 and 550 mg/kg, respectively. After an hour, the animals were slaughtered, and the stomachs, along with the more pronounced curve, were opened and thoroughly studied. The following scoring system (Table 1) was used for allocating a grade to the ulcers:

TABLE 1. ULCER GRADING AS PER THE SCORE.

| Grade | Description |
|--------------|--------------------|
| 0 | ordinary mucosa |

| | |
|-----|--|
| 0.5 | blushing |
| 1.0 | spot ulcers |
| 1.5 | bleeding streaks |
| 2 | ulcers that are larger than 3 mm but smaller than 5 mm |
| 2.5 | ulcers >5 mm |

Histamine-induced ulcers (21).

Group 1 underwent the same procedure. They were kept without food for 18 hours and without water for 12 hours. Six rats were gathered and divided into four groups. Group 1 received a 0.025% CMC suspension as a vehicle control, while Group 2 was administered the reference medication famotidine (35 mg/kg p.o.) for treatment. Groups 3 and 4 were given SNBM at doses of 300 and 550 mg/kg p.o. respectively. After an hour of receiving the reference and test medications, the animals were administered histamine at a dose of 10 mg/kg. The animals were subsequently killed, the stomachs were opened along the larger curvature, and they underwent comprehensive examination after having been rinsed with normal saline. The stomach mucosa was examined and graded as shown in Table 1 above.

Ethanol-induced gastric ulceration (22).

Out of the four animal groups (n = 6), Group 2 was administered omeprazole at the suggested dose (10 mg/kg p.o.), while Group 1 was provided with a 0.025% CMC suspension as the vehicle control. Oral SNBM doses of 300 and 550 mg/kg were given to groups 3 and 4, respectively. The animals were given ethanol orally at a dose of 1 mL/200 g after ingesting the reference drug and the last dose of EEBM (Ethanollic Extract of *Butea monosperma*). After an hour, the animals' stomachs had been removed along the bigger curvature to check for ulcers, and they were then gently put to death by cervical dislocation. Using a Potter-Elvehjam homogenizer, the fundic mucosal part of the stomach was homogenized (5%) in ice-cold 0.9% normal saline. Following centrifugation of the homogenate at 800 rpm for 10 minutes and at 12000 rpm for 15 minutes, the mitochondrial fraction was utilized to measure lipid peroxide and glutathione levels. Lipid peroxidation TBARS was assessed using the Ohkawa technique (23), and Ellman's reaction with DTNB (5-5-dithio-bis-2-nitrobenzoic acid) was employed to confirm glutathione.

Result and Discussion

The aim of this study was to assess the anti-ulcer activity of the EEBM across different ulcer models. Indomethacin, a powerful inhibitor of prostaglandin (PG), and suppression of PG synthesis by indomethacin correspond with the early stages of damage to mucosal, parietal, and endothelial cell membranes. There is a correlation between gastric acid secretion and the emergence of mucosal ulcers triggered by indomethacin. The EEBM demonstrated substantial safety against indomethacin-induced stomach ulcers and considerably reduced the ulcer index. Furthermore, EEBM has demonstrated significant efficacy in the treatment of histamine-induced

ulcers. Histamine is considered to cause stomach ulceration via increasing gastric acid output and vasospastic action Figure 1(24).



Figure 1. Graphical representation of the present work.

Indomethacin and histamine-induced ulcer.

The impact of SNBM on ulceration induced by indomethacin and histamine was investigated, and the findings are detailed in tables 2 and 3. The synthesized SNBM notably reduced ulceration resulting from indomethacin and histamine. Extracts at doses of 300 and 550 mg/kg displayed 32.23% and 51.31% protection ($p < 0.05$), respectively, against indomethacin-induced stomach ulcers, while famotidine exhibited 63.15% protection ($p < 0.05$). For histamine-induced ulceration, EEBM at 500 mg/kg provided 55.42% protection, whereas famotidine (30 mg/kg) offered 65.15% protection.

ANOVA and Dunnet's test were implemented for calculating statistical significance ($* p < 0.05$ indicated significance in comparison to the indomethacin-treated group). The data is represented as mean \pm S.E.M.

TABLE 2. RATS' ULCERATIONS CAUSED BY INDOMETHACIN AND THE IMPACT OF BUTEA MONOSPERMA ETHANOL EXTRACT (EEBM).

| Treatment | Dose (mg/kg) | Ulcer index | Percentage inhibition |
|---------------------------|--------------|-----------------|-----------------------|
| Normal | --- | 00 | 100 |
| Indomethacin + vehicle | 20 | 15.5 \pm 1.5 | --- |
| Indomethacin + famotidine | 35 | 6.1 \pm 0.8* | 65.15 |
| Indomethacin + SNBM | 300 | 10.5 \pm 1.0* | 35.32 |
| Indomethacin + SNBM | 500 | 7.5 \pm 0.5* | 55.13 |

TABLE 3. RAT ULCERATION TRIGGERED BY HISTAMINE: THE INFLUENCE OF BUTEA MONOSPERMA ETHANOL EXTRACT.

| Treatment | Dose (mg/kg) | Ulcer index | Percentage inhibition |
|---------------------------|--------------|-------------|-----------------------|
| Normal | --- | 00 | 100 |
| Indomethacin + vehicle | 20 | 15.5 ± 1.5 | --- |
| Indomethacin + famotidine | 35 | 5.9 ± 0.7* | 71.15 |
| Indomethacin + SNBM | 300 | 15.6 ± 1.0* | 35.72 |
| Indomethacin + SNBM | 500 | 10.5 ± 0.8* | 55.42 |

Gastric ulcers caused by ethanol.

As per the investigation, SNBM was assessed for its anti-ulcer efficacy towards ethanol-induced stomach ulcers, and the outcomes are outlined in Table 4. When ethanol was taken orally, it caused severe ulceration, markedly raising lipid peroxide levels and sharply lowering glutathione levels. In the model of ethanol-induced ulcers, SNBM notably decreased both the occurrence and severity of ulcers. EETP orally administered at 550 mg/kg b.w (Body weight) offered 52.52% protection, while the reference medication omeprazole provided 59.92% protection. Animals receiving EEBM orally at a dosage of 550 mg/kg b.w significantly decreased the thiobarbituric acid reactive substance from 4.61(±0.23) to 2.38(±0.17) % ($p < 0.05$).

TABLE 4. THE IMPACT OF BUTEA MONOSPERMA ETHANOL EXTRACT ON ETHANOL-INDUCED ULCERATION IN RATS.

| Treatment | Dose (mg/kg) | Ulcer index | Percentage inhibition | TBARS (nmol MDA/mg protein) | Glutathione of (nmol/mg protein) |
|---------------------------|--------------|-------------|-----------------------|-----------------------------|----------------------------------|
| Normal | --- | 00 | 100 | 1.47±0.13 | 10.4±1.1 |
| Indomethacin + vehicle | --- | 25.7 | --- | 4.63±0.25 | 4.5±0.4 |
| Indomethacin + omeprazole | 35 | 10.5 | 59.94* | 1.84±0.16* | 5.4±0.5* |
| Indomethacin + SNBM | 300 | 17.4 | 33.09* | 3.54±0.22* | 9.0±0.9* |
| Indomethacin +SNBM | 550 | 12.4 | 52.54* | 2.40±0.19* | 6.9±0.5* |

The data were expressed as mean ±S.E.M. and statistical significance was determined using ANOVA and Dunnet's test ($p < 0.05$ was considered significant).

CONCLUSION

It has been discovered that oxygen-derived free radicals play a part in the process of acute and chronic ulceration, and that scavenging these free radicals can help heal these ulcers. Ethanol-induced free radical production raises lipid peroxide levels while decreasing cysteine, which is

necessary for glutathione synthesis, lowering glutathione levels (25). Reduced glutathione is abundant in the stomach mucosa of rats (26) and humans. Glutathione is necessary for mucosal integrity, and glutathione deficiency in the stomach mucosa causes macroscopic mucosal ulceration (27). Compared to the control animals, oral ethanol administration significantly elevated the lipid peroxide (TBARS) level and induced severe stomach injury, accompanied by a reduction in the stomach mucosa's glutathione content. In contrast, compared to the untreated mice, the EEBM substantially decreased the heightened lipid peroxide level and reinstated the depleted glutathione level. It's possible that EEBM's antioxidant action is what prevents ethanol from inflicting stomach damage. Additionally, the phytochemical examination of EEBM has established that gallic acid and ellagic acid are the two main constituents. Ellagic acid, one of the commonly found polyphenols, has powerful antioxidant capabilities (28). Due to the suppression of H[±]- and K[±] ATPase activity, it has a notable inhibitory effect on acid secretion and the formation of stress-induced gastric lesions (29). Biochemical investigation findings revealed a sizable antiperoxidative impact. The current study thus comes to the conclusion that the EEBM (Ethanollic Extract of *Butea monosperma*) has demonstrated notable antiulcerous effect by boosting the gastric mucosa's antioxidant potential and thereby minimising mucosal damage.

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