https://doi.org/10.33472/AFJBS.6.2.2024.143-153

African Journal of Biological Sciences

Research Paper Open Access

Investigating the Biological and Social Dimensions of Congenital Heart Pathologies in a Globalized Society

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Article History

Volume 6,Issue 2, Feb 2023

Received:17 Dec 2023

Accepted : 08 Jan 2024

Published : 27 Jan 2024

doi: 10.33472/AFJBS.6.2.2024.143-153

Abstract

The issue of congenital heart defects in the modern world is no longer considered solely a medical concern. It has become a complex interplay of pediatric healthcare, social dynamics, and economic indicators, which are, to a significant extent, its outcomes. Global statistics acknowledge that a low quality of life and an increase in negative environmental factors create a fertile ground for the rising incidence of congenital cardiac pathologies in children.

This study sheds light on the medical and social factors that define the socio-economic dimension of this problem. Congenital heart defects often lead to disability, and the picture of social incapacity invariably carries substantial socio-economic consequences.The article underscores the advancements made in the diagnosis and treatment of congenital heart defects, along with the evolution of cardiac surgery, which has enabled many young patients to transition into full adult lives.Of particular concern to the author is the social aspect of this medical problem because socio-economic factors significantly determine the capabilities of both medicine and the population to access its assistance.

Research Objective: To demonstrate the social dimension of the medical problem of congenital cardiac pathologies in contemporary conditions

Research Objectives:

To analyze the prevalence of congenital heart pathologies in children and demonstrate their social significance.

To identify the causes and conditions leading to congenital heart defects in children.

To pinpoint the primary risk factors as the etiology of congenital heart defects.

To assess the role of prevention as a measure to reduce the risk of congenital heart defects.

To emphasize the importance of the rehabilitation process for children with congenital heart defects.

Methodology:

This research is based on the following principles:

- Analyzing the issues of congenital heart pathologies in the context of a globalized society to find ways to combat them.
- Identifying the causes of congenital heart pathologies.
- Establishing the level of risk and probability of being a carrier of congenital heart pathologies.

Scientific Novelty:

Common socio-hygienic factors that influence the onset and subsequent development of congenital heart defects in children have been identified.

It has been confirmed that socio-demographic factors directly determine the statistics of congenital heart pathologies.

The practical significance of this study lies in its potential to inform the optimization of healthcare programs for children with congenital heart pathologies. The author concludes that addressing the medical issue of congenital heart pathologies is feasible only through the simultaneous resolution of its socio-demographic and psycho-pedagogical dimensions.

Keywords: anomaly, diagnosis, child health, treatment, pathology, defect, prevention, risk, rehabilitation, disease progression.

Introduction

In the context of the modern globalized society, the population's health is regarded as one of the primary factors influencing the state of the labor force and, consequently, the overall economic condition of a nation. As a result, a distinct area of social work focuses on monitoring the health of children, who represent a prospective labor resource, and

specifically, the health of newborns. Despite the achievements in contemporary medicine, congenital heart defects remain a pertinent and substantial issue due to their severe disease progression and high mortality rate.

Healthcare professionals have noted significant changes in the structure of cardiovascular pathologies in children in recent years. The pattern of these changes is as follows: a decrease in the number of rheumatic heart diseases and bacterial endocarditis cases, while disturbances related to cardiac rhythm and cardiomyopathies remain at a consistent level [1]. These changes have been influenced by the implementation of modern heart disease treatment methods and the enhancement of diagnostic capabilities.

Medical practitioners worldwide are concerned that the low quality of life in various regions of the world and numerous adverse environmental factors create conditions conducive to a positive trend in the incidence of congenital heart defects in children. This situation presents a substantial medical, social, and economic challenge.

The social aspects of congenital heart pathology have been the subject of research by medical scientists from various countries worldwide. Russian researchers have also devoted significant attention to this topic. Western experts, such as J. Kamphuis, H. Ottekamp, and W. Vliegen, have analyzed the correlation between the physical condition and the quality of life of patients who underwent childhood heart defect surgeries. Meanwhile, G. Nollert, T. Fischlein, and S. Bouterwek have explored the social, emotional, and psychological issues faced by adult patients with congenital heart pathologies. Studies by V. I. Burakovskiy and L. A. Bokeria have delved into the survival and mortality ratios in different periods of a child's life, taking into account various nosological groups of heart defects. Additionally, dissertations on issues related to the medical and social support of children with congenital heart pathologies, including S. K. Abdulkasumova, E. V. Bolotova, and A. Yu. Chernova has been defended.

Scientists worldwide collectively advocate for the elimination of modifiable risk factors that increase the likelihood of heart pathologies. They view this as the path to addressing the overarching medical and social issue of heart defects. Particular attention must be devoted to implementing preventive measures that proactively tackle potential problems.

Prevalence of Congenital Heart Pathologies in Children and Their Social Significance

Congenital heart defects, characterized by high mortality rates, continue to present formidable challenges to modern medicine, particularly pediatric care, and maintain their relevance across most countries, despite advances in diagnosis, treatment, and patient rehabilitation. In the latter half of the 20th century, the achievements in cardiothoracic surgery provided the opportunity for many patients with congenital heart defects to lead virtually healthy lives following surgical interventions, enabling them to engage in active lifestyles, feeling complete and socially active.

Medical practice observes that in recent years, the nature of cardiovascular pathology has undergone a significant transformation due to the application of modern diagnostics and cutting-edge treatment methods. Nevertheless, this problem persists as a highly acute medical, demographic, and socio-economic concern, merging in certain regions with parameters of national and ethnic issues.

Quality of life that does not meet contemporary standards, detrimental habits, deviant behavior among the adult reproductive-age population, insufficient or absent access to healthy nutrition and clean water, work and rest patterns that deviate from norms, and the unnatural pace of modern life have led to an increase in congenital heart pathologies in children.

Medical statistics indicate that 5% of newborns exhibit developmental defects, and the mortality rate for these children accounts for one-fifth of overall infant mortality. Additionally, in recent decades, there has been a noticeable upward trend in the prevalence of congenital

anomalies among adolescents. For example, in the 1990s, there were 1,473 cases per 10,000 individuals, while in the 2000s, this figure increased to 1,980 cases per 10,000 individuals.

Statistics regarding congenital childhood pathologies exhibit distinct regional characteristics in the Russian Federation. The Northwestern Federal District ranks first in terms of developmental defects in children, with 702 cases per 10,000 individuals, followed by the Volga Federal District with 626 cases per 10,000 individuals, and the Far Eastern Federal District with 625 cases per 10,000 individuals.

Congenital heart defects hold the third position among congenital pathologies. The infant mortality rate due to heart pathologies stands at 15 children per 10,000 births [2].

Congenital heart pathologies necessitate medical intervention from birth, and in their absence, up to 50% of infants do not survive their first year. Surviving children who manage to overcome the critical threshold of one year of age continue to experience progressive heart failure, ultimately leading to disability or death at a later age.

Research findings from Russian medical scientists and their international counterparts converge on the fact that perinatal losses occur in one out of every five cases of congenital heart defects.

Congenital heart defects impact the development of a growing child, often leading to disability, which carries social and economic implications. This results in educational challenges for the child, creates additional difficulties for the family in establishing special living conditions for the disabled child, and diminishes the quality of upbringing for other children within the family.

The economic damage to the state caused by the disability rate of the population is quantified by the absence of the disabled individual in the workforce, the sum of disability payments over the entire period of incapacity, the cost of their medical treatment and rehabilitation, and the diversion of parents or caregivers from gainful employment. Furthermore, childhood disability demands sustained medical and social support, the creation of specialized educational and socialization opportunities, and the inclusion of these children in community life.

Congenital heart pathologies impose a wide range of limitations on affected children, severely curtailing their potential for active leisure, social interaction with peers, engagement in sports, travel, and mobility. Such restrictions are acutely distressing for individuals, particularly in childhood. The plight of a child with a congenital heart defect leaves a profound mark on the lives and development of other children within the family, as well as on the quality of life perceived by parents and loved ones.

Specialists in the field of illness psychology note that the psychological state of children with congenital heart pathologies and their family members stands out in the context of pathologies from other nosological groups, characterized by a unique vulnerability and sensitivity. Similarly, society's attitude toward individuals with congenital heart defects traditionally carries characteristics of empathy and compassion, further characterizing this pathology as socially significant.

In addition to genetic determinants, congenital cardiovascular pathologies also elicit heightened concern from society due to their hereditary nature. A child, as a carrier of hereditary heart pathologies from birth, is perceived by society as an innocent victim, burdened with the defects of our world. Families with ill children, with varying incomes, are not always capable of providing the necessary conditions for the full domestic care of their children or ensuring the provision of essential resources. Moreover, regional social injustices play a role. In large cities and central federal districts, the level of medical and social assistance to children with congenital heart pathologies is significantly better. Here, qualitatively different conditions for their adaptation and rehabilitation have been established. Russia's vast territory, its geographic and landscape diversity spanning from

subarctic to subtropical climates, necessitates special attention in the organization of comprehensive healthcare for the population, especially for children with heart pathologies. An element of paramount importance is the accessibility of diagnosis, surgical intervention, and quality rehabilitation in the country's leading medical institutions.

The social-psychological aspect of the problem is to minimize the sense of social vulnerability and helplessness experienced by both affected children and their parents. Maximizing positive social involvement in their lives and enhancing federal and regional governmental support can aid in the battle against this ailment, allowing individuals to live with it and, whenever possible, lead a full and active life.

Causes and Conditions of Congenital Heart Defects in Children

The medical and social problem of congenital childhood heart pathologies and their severe consequences necessitates special attention to the factors contributing to this phenomenon and the array of circumstances capable of exacerbating or mitigating this issue. One of the causes behind the development of congenital heart defects in children is the adverse impact of environmental factors. Many congenital pathologies serve as indicators of environmental adversity, and congenital heart defects are no exception. Among the varieties of such adversity, we examine the ecological aspect, which is characteristic of many regions worldwide.

Russia, a nation housing modern metropolises, industrial giants, transportation conglomerates, areas with intensive agricultural practices utilizing contemporary means of plant growth stimulation and protection, as well as regions involved in resource extraction and enrichment, cannot consistently declare the complete environmental well-being of territories inhabited by its populace. A polluted living environment exerts a potent mutagenic influence on human heredity, thus harboring genetic consequences.

There are instances when a considerable number of infants with cardiac pathologies are born in specific regions, resembling an epidemic. One explanation for such a phenomenon lies in the impact of radiation in the technogenic environment and viral epidemics.

Scientists and Medical Professionals note that in the 21st Century, the problem of the negative influence of the rubella virus remains unresolved, as it can lead to the congenital rubella syndrome. "When the virus affects the mother during the first month of pregnancy, heart defects such as septal defects may occur. If the virus acts later in pregnancy, after the third month, defects such as atrioventricular stenosis, valve deformities, and chordal deformities may manifest" [3]. The rubella virus is yet to be eradicated in Russia, primarily due to socio-psychological factors such as unsanitary conditions, low household culture, an unfavorable moral-psychological climate within families, improper dietary habits among pregnant and breastfeeding mothers, and children.

Developmental anomalies in children are linked to "unfavorable influences on their parents' health due to occupational factors (workplace hazards), maternal age, maternal illnesses during pregnancy, as well as the chronic illnesses of both parents and their harmful habits. Other contributing factors include a history of abortions, maternal use of antibiotics and hormonal medications, consanguineous marriages, and unions between individuals with similar pathologies" [4].

Main Risk Factors as the Primary Causes of Congenital Heart Defects

In modern medicine, numerous researchers have strived to identify the primary causes that trigger the development of congenital heart defects in children. Several scientific works, based on research, have been written on this subject. Many specialists concur that adverse conditions accompanying the course of pregnancy, occupational hazards, parental age, their

antisocial habits, chronic diseases, and unsanitary living conditions are pivotal risk factors for congenital heart defects.

According to N.A. Belokon, "the primary risk factors for giving birth to children with this affliction include endocrine disorders, parental age, maternal toxemia in the first trimester, and threats of pregnancy termination, a history of stillbirths, maternal use of pharmacological drugs during pregnancy (especially endocrine ones to maintain the pregnancy), and the existence of older children with heart pathologies in the family" [5]. Medical researchers V.N. Shvedunov and V.P. Podzolkov supports this opinion.

M.B. Medvedev and D. Hess draw attention to the following risk factors: infectious diseases or gestational diabetes in the mother, especially when she is over 35 years old, her use of pharmaceuticals, genetic predisposition, and fetal chromosomal abnormalities.

N.P. Shabalov specifically highlights the risk factor of a woman's reproductive age extremes (below 18 and above 40 years). This medical and social issue varies according to specific societal conditions. In the 1980s to 1990s, the statistics more frequently identified the lower age limit, whereas presently, the upper age limit is becoming more common, with mothers contemplating childbirth as they approach their "final age-related opportunity".

E.D. Bespalova states that "the formation of congenital heart defects in a fetus is influenced by the following risk groups:

- Social factors (presence of older siblings in the family with congenital heart defects, congenital heart defects in parents and relatives, parental viral infections, first births at around the age of 40);
- Fetal risk factors (presence of fetal rhythm disturbances, extracardiac anomalies, chromosomal abnormalities, fetal growth restriction, non-immune fetal hydrops, deviations in fetoplacental blood flow indicators)"** [6].

In modern medicine, prenatal diagnostics play a crucial role in detecting various fetal pathologies, including congenital heart defects, with echocardiography taking a central place in this process. There is a diverse range of opinions among scientists. Some believe that such examinations should be carried out only for pregnant women with reasons to classify them as a high-risk group concerning heart pathologies, while others argue for the importance of conducting echocardiographic examinations for all pregnant women without exception.

However, the issue takes on socio-economic nuances since the technical support for prenatal diagnostics in many regions does not fully comply with modern requirements.

Studies conducted by Z.A. Spasskaya in the Volga region have shown that "the most common risk factors for the development of congenital heart defects in children are: maternal illnesses in the first half of pregnancy, toxemias throughout pregnancy, the influence of parental occupational hazards, and their chronic diseases, as well as previous abortions by the mother" [7].

In the research of T.P. Gryaznova, the following risk factors have been identified: "toxemias and threatened miscarriages in the first half of pregnancy, the use of hormonal and acupuncture therapy to prevent threatened miscarriages" [8].

"Medical and social analysis of risk factors provides the opportunity to forecast the dynamics of congenital heart defects in children. In Russia, medical professionals have proposed various methodologies for predicting the development of the most common congenital heart pathologies.

As a result, specialists have come to a general conclusion that the risk prediction of congenital heart defects in children, in modern conditions, should be carried out at least at three stages: before the conception of a child (medical-genetic consultations, women's consultations, "Marriage and Family" consultations), during pregnancy and childbirth (women's consultations, maternity hospitals), and in the first days after the child's birth

(maternity hospitals, pediatric clinics, neonatal units) with subsequent determination of prognostic coefficients and identification of risk groups among pregnant women and newborns, followed by in-depth examination of these groups" [9].

This analysis allows us to conclude that the task of studying risk factors for the development of congenital heart pathologies is one of the pressing issues in the field of child and family health care. The central role in the comprehensive problem of congenital heart pathologies is the elimination of manageable risk factors for their development.

Prevention of Congenital Heart Defects as a Pathology

Preventing and avoiding the onset of any ailment is a complex matter that requires consideration of multiple factors, the specificity of regional conditions and social background (welfare), the level of environmental and epidemiological well-being, as well as the quality of healthcare access for the population.

Prevention of congenital heart defects is conventionally divided into prevention of occurrence, prevention of adverse development, and prevention of complications of congenital heart defects.

Research by A.E. Czeizel, based on long-term observations of cases of congenital developmental defects in Western countries, has led to the conclusion that "preventive measures can prevent 50% of congenital developmental defects. Even in developing countries, more than 10% of congenital developmental defects can be prevented" [10].

Positive results can be achieved through collaboration between obstetrics and gynecology, medical genetics, and pediatric services. B.C. Baranov emphasizes that "the most effective methods of preventing the birth of children with any developmental anomalies are prenatal diagnostics and medical-genetic counseling" [11].

In modern conditions, prenatal diagnosis of congenital heart defects is possible through comprehensive fetal echocardiography. M.V. Medvedev points out that the quality of prenatal diagnosis of congenital heart defects is significantly influenced by factors such as government screening programs, the maintenance of registries of congenital and hereditary pathologies, and the interaction of specialists at all levels of patient examination.

Drawing upon data obtained from research conducted by both foreign and domestic experts, M.V. Medvedev has formulated the "basic principles of effective prenatal diagnosis of congenital heart defects" [12]:

1) Conducting screening "anatomical" ultrasound examinations for all pregnant women without exception.
2) Examination of the fetal heart anatomy.

E.D. Bespalova notes that women classified as high-risk should undergo mandatory fetal echocardiographic monitoring. In the event of any pathology, the scientist recommends conducting additional echocardiographic examinations to refine the diagnosis.

Prospective parents can obtain all the information they require regarding the risk of congenital and hereditary pathologies in medical-genetic counseling sessions. The development of medical-genetic counseling services holds great social and medical significance, making its full support an ongoing priority in Russia, as it is closely associated with economic factors related to the labor force.

In modern medicine, the monitoring of congenital developmental defects is used as a method of preventing congenital pathologies. It is used to identify areas where such defects are most commonly found. The formation of these areas is due to the detrimental influence of negative environmental factors during the intrauterine development period. According to M. Klmberg, monitoring of congenital developmental defects is the best way to identify the causes of their formation, the majority of which are a result of human-transforming activities.

Population monitoring, as an indirect method, allows for the assessment of the relative impact of negative environmental factors on the human body. This is because the direct study of the harmful effects of environmental factors on humans is currently unfeasible.

There are two main monitoring programs: "EUROCAT" for the epidemiological analysis of congenital anomalies and "ICBDMS" for identifying newly emerging teratogens in the environment. Both programs operate in close collaboration, which significantly enhances their effectiveness.

In the 1990s, the Federal system for monitoring the birth of children with developmental defects was established in Russia. There are two methods of research: hospital-based and population-based. In the first case, samples are formed based on the births of children with pathologies in selected hospital groups within a region, providing faster and higher-quality information. In the second method, all such cases within a specified geographic area are registered, making it easier to track the link between pathologies and risk factors.

S.I. Kozlova suggests that it is "reasonable to combine both methods, especially in large regions, i.e., to combine several small population-based registers with a hospital-based register." To ensure the accuracy of the diagnosis, it is recommended (N.S. Demikova, B.A. Kobrinsky, S.I. Kozlova) to use multiple registration sources, including hospitals, maternity wards, medical-genetic counseling centers, and pediatric clinics, which contributes to the precision of diagnosis accounting.

B.A. Kobrinsky points out that "multiple sources provide the opportunity to obtain information about developmental pathologies not only in newborns but also in older children, which is crucial because some pathologies, including those related to the cardiovascular system, may not be diagnosed at birth or the diagnosis may change upon monitoring the young patient." Consequently, the rate of detecting congenital defects will be higher when the data in the registry is maximized. Collecting and forming such data is more accurate when the observation period for a child is extended over time, meaning observations are most effective when they are prolonged.

It is also important to consider developmental defects detected through additional examination methods, not just the obvious ones identified during routine inspections. These should be recorded not only among live-born children but also among stillborn infants.

A separate database comprises outcomes from abortions. The challenge here is that only abortions performed after diagnosing a developmental defect in the fetus are recorded. Other abortions performed without specifying reasons are not registered, regardless of the presence or absence of defects.

Preventing congenital heart defects as a pathology is a complex, responsible, labor-intensive process that requires precise data collection and processing, professional expertise, and a dedicated commitment of specialists to their work. However, the result of this significant effort is the timely detection of developmental pathologies, the correction of which can change an individual's life and, consequently, society.

Rehabilitation of children with congenital heart defects

The issue of rehabilitating children with congenital heart defects is particularly relevant due to the increasing trend in the number of surgeries following the diagnosis of the defect. This is followed by an equally important and responsible period of recovery.

As early as the 2000s in Russia, around 6,000 surgeries were performed annually for congenital heart defects, half of which involved artificial circulation. An examination of the problem shows that the number of patients requiring surgical treatment is much higher.

Rehabilitation involves a series of measures (medical-psychological, socio-adaptive, educational-pedagogical) aimed at eliminating or partially compensating for limitations in life activities caused by developmental pathologies. Logically, rehabilitation measures for

children are structured as follows: restorative treatment, followed by the resolution of psychological, and then social and pedagogical issues.

D.I. Zelinskaya leans towards the idea that "in addition to therapeutic and health-improving measures, significant attention should be paid to psychological correction to form an adequate self-perception in the young patient during illness. Involving close social circles in the recovery process is essential because illness changes the style and character of social interaction. Furthermore, pedagogical correction, which is especially important for the child, can reinforce the effectiveness of all the aforementioned measures" [15].

In the 1980s, L.F. Nikolaeva, conducting a social analysis of rehabilitation practices in Russia at that time, defined positions that enhance the effectiveness of the rehabilitation process as a whole [16]:

- Combining rehabilitation with the treatment process, initiating it early;
- Developing an individual rehabilitation program for each patient, considering the nature of the disease and their personal characteristics;
- Making collective decisions on constructing an individual program for each patient;
- Ensuring the continuity of the rehabilitation process with its obligatory completion;
- Maintaining logical consistency among the stages of rehabilitation with continuity between them;
- Conducting rehabilitation procedures collectively while adhering to the principle of an individual approach to each patient;
- Providing equal access to full-fledged rehabilitation for all;
- Maintaining flexibility in the work of rehabilitation services and responding in a timely manner to changes in the disease's structure, taking into account the social component in the manifestation of the illness.

The implementation of rehabilitation programs for children significantly lags behind that of adults, primarily due to the undervaluation of this issue in socio-economic terms. Society often fails to consider the long-term consequences for the labor force, and children are not objectively assessed as an economic factor or labor reserve. Furthermore, adult patients consciously perceive the necessity of rehabilitation, while children depend on the decisions of their parents or guardians, relying on their understanding of the importance of rehabilitation and their willingness and ability to facilitate it.

In Russia, there is no regulated system for postoperative rehabilitation of children. Only a few cardiac rehabilitation sanatoriums offer selective rehabilitation activities, and there is a lack of methodological consistency in rehabilitation programs and their effectiveness evaluation.

The physical aspect plays a significant role in the rehabilitation of patients after surgical treatment for congenital heart defects. It is crucial to assess the physical fitness of patients and their body's response to controlled physical exertion.

Additionally, the psychological dimension holds a crucial place in rehabilitation programs. This involves studying the emotional and personal sphere, determining the level of social adaptation (or maladaptation) influenced by the illness, understanding the role of social relationships in shaping psychological perceptions of the environment and forming social status, and developing an individualized approach to psychodiagnostics and psychocorrection.

Research has shown that patients experience changes in their cognitive abilities, characterized by impaired memory and attention, rapid fatigue, depletion of capabilities, and a limitation in the ability to switch from one type of activity to another. This underscores the

need to enhance rehabilitation programs with a specific focus on their psychological components.

Conclusion

In the context of the contemporary social environment, both globally and in Russia, the predisposing factors for the increasing incidence of congenital developmental defects, including congenital heart defects, are the low quality of life among the population and harmful environmental factors. Over the last few decades, along with changes in the healthcare landscape and the population's infection patterns, the structure of heart pathologies in children has also evolved.

Russian statistics indicate that in the past two decades, approximately 45% of child mortality within the first year of life can be attributed to congenital heart defects, and this trend has been on the rise each year.

Families with children suffering from congenital heart defects face several primary challenges, including economic, psychological, and social issues, which further compound their already complex medical problems. Economic problems often become the primary barrier to receiving timely medical care for the affected children, as they involve additional financial burdens on the family for hospital stays, pharmaceuticals, consultations, and rehabilitation.

Reducing the prevalence of congenital heart defects can be achieved through the prediction of the development of this pathology. Various procedures, methods, and measures are employed to identify the impact of environmental factors on the formation of the risk of congenital heart pathologies. These tools require continuous and timely updates.

Medical diagnostics play a pivotal role in preventing the spread of congenital heart pathologies, with the quality and timeliness of diagnostics being the decisive factors.

The socio-economic dimension of the issue involves the organization and implementation of comprehensive rehabilitation for children with congenital heart defects, a practical endeavor that involves the collaboration of healthcare, educational, and social protection authorities.

The research's objective, which aimed to highlight the significance of the social aspect of medical issues related to congenital heart pathologies in modern conditions, has been accomplished.

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Cite this article as: **Elena Valentinovna Korableva** Investigating the Biological and Social Dimensions of Congenital Heart Pathologies in a Globalized Societyd, African Journal of Biological Sciences. 5(2), 143-153.
doi: 10.33472/AFJBS.6.2.2024.143-153