

Hypertension: Pathophysiology, Prevalence, and Advancements in Diagnosis and Management

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Abstract: Hypertension, also known as high blood pressure, is a major global health concern, impacting over a billion people worldwide. It is a leading cause of both morbidity and mortality, contributing significantly to cardiovascular diseases, stroke, and kidney failure. The condition is often asymptomatic, earning it the nickname "silent killer," as many individuals are unaware of their elevated blood pressure until severe complications arise. This makes hypertension a significant public health challenge, as early detection and management are crucial to reducing its burden on individuals and healthcare systems. The pathophysiology of hypertension involves a complex interplay between genetic, environmental, and lifestyle factors. It is characterized by sustained high blood pressure, which can damage blood vessels and vital organs over time. Various mechanisms, including increased vascular resistance and fluid volume imbalance, contribute to the development of hypertension. Environmental factors, such as poor diet, lack of physical activity, and stress, also exacerbate the condition. Globally, the prevalence of hypertension continues to rise, particularly in low- and middle-income countries. This highlights the need for comprehensive screening and public health initiatives to raise awareness. Current diagnostic approaches typically include measuring blood pressure at regular intervals, with the aim of identifying individuals at risk before complications develop. In terms of management, lifestyle modifications such as adopting a healthier diet, regular exercise, and stress reduction are essential in controlling hypertension. Pharmacological treatments, such as ACE inhibitors, beta-blockers, and diuretics, are commonly prescribed. Emerging therapies, including novel drug classes and personalized treatment strategies, hold promise for improving patient outcomes. Ultimately, early detection, lifestyle changes, and appropriate treatment are key to managing hypertension effectively, reducing its complications, and enhancing the quality of life for affected individuals.

Keywords: Hypertension, Blood Pressure, Cardiovascular, Risk Factors, Treatment, Management..

1. Introduction

Hypertension, also known as high blood pressure, is a chronic medical condition that is defined by consistently elevated blood pressure levels. Blood pressure is typically measured as two values: systolic pressure (the force exerted when the heart contracts and pumps blood) over diastolic pressure (the pressure when the heart is at rest between beats). A blood pressure reading of 140/90 mmHg or higher is generally considered to be hypertensive. This condition is one of the most common and widespread health issues globally, affecting an estimated 1.13 billion people across the world. The prevalence of hypertension is steadily increasing, driven by various lifestyle and demographic factors,

including population aging, sedentary behavior, poor dietary choices, and increasing levels of stress [1]. Despite its widespread prevalence, hypertension is often referred to as a "silent killer" because it typically does not present any immediate symptoms. This lack of noticeable symptoms leads to the condition being underdiagnosed in many individuals. Without symptoms, many people remain unaware of their high blood pressure until significant damage has already occurred to vital organs such as the heart, kidneys, and brain. As a result, hypertension remains one of the leading risk factors for serious cardiovascular diseases, including heart attack, stroke, heart failure, and chronic kidney disease. These conditions, which arise from the prolonged effects of high blood pressure, contribute significantly to global morbidity and mortality rates [2].

Hypertension's impact on cardiovascular health is well-documented. When blood pressure is elevated, the heart is forced to work harder to pump blood throughout the body. Over time, this strain can cause the heart muscle to thicken, leading to conditions like left ventricular hypertrophy (enlargement of the heart's left chamber). Additionally, high blood pressure accelerates the process of atherosclerosis, the hardening and narrowing of the arteries, which can increase the risk of heart attacks, strokes, and other cardiovascular events. Moreover, persistent hypertension can damage the blood vessels in the kidneys, leading to chronic kidney disease, a progressive loss of kidney function that can eventually result in kidney failure [3]. Despite its asymptomatic nature, hypertension is highly treatable, and early detection plays a critical role in preventing the adverse outcomes associated with the condition. Early diagnosis allows for the implementation of lifestyle changes and, if necessary, medical interventions that can help control blood pressure levels. Key treatment strategies for managing hypertension include dietary modifications, such as reducing salt intake, increasing physical activity, and managing stress levels. In some cases, antihypertensive medications may be prescribed to help control blood pressure and reduce the risk of complications [4].

The current approaches to managing hypertension focus on both lifestyle changes and pharmacological treatments. For lifestyle modifications, individuals are often advised to adopt a heart-healthy diet rich in fruits, vegetables, whole grains, and low-fat dairy, while limiting processed foods and salt. Physical activity is another cornerstone of hypertension management, as regular exercise helps to improve cardiovascular health and reduce blood pressure. Weight management, limiting alcohol intake, and quitting smoking are also crucial components of a healthy lifestyle for individuals with hypertension. Pharmacologically, a range of antihypertensive medications are available, each working through different mechanisms to lower blood pressure [5]. These include angiotensin-converting enzyme (ACE) inhibitors, angiotensin II receptor blockers (ARBs), beta-blockers, diuretics, and calcium channel blockers. The selection of medication depends on the individual's overall health, the presence of other medical conditions, and the severity of hypertension. In many cases, a combination of medications may be used to achieve optimal blood pressure control [6].

Recent advancements in the understanding of hypertension have led to the development of new medications and treatment approaches. Ongoing research aims to identify more effective therapies that can not only control blood pressure but also reduce the long-term risks associated with hypertension, such as the development of cardiovascular diseases and kidney failure. Additionally, research into genetic factors and the underlying mechanisms of hypertension is providing valuable insights that could lead to more personalized treatment strategies in the future. The epidemiological burden of hypertension is substantial, and it continues to grow. As populations age and lifestyle factors such as poor diet and lack of physical activity become more prevalent, the global prevalence of hypertension is expected to increase. This trend presents significant challenges for public health systems around the world, as hypertension management is often complex and requires long-term care. However, it also presents an opportunity for public health campaigns aimed at raising awareness about the risks of hypertension and the importance of regular blood pressure monitoring [7].

2. Pathophysiology of Hypertension

The pathophysiology of hypertension is complex and multifactorial, involving a combination of genetic, environmental, and lifestyle factors that regulate blood pressure. One of the primary

mechanisms contributing to sustained hypertension is increased cardiac output, which refers to the amount of blood the heart pumps per minute. Conditions such as hyperthyroidism or stress can elevate cardiac output, leading to an increase in blood pressure. Another key factor is the increased peripheral vascular resistance (PVR), which occurs when small arteries and arterioles become narrowed due to vascular remodeling. This narrowing increases resistance to blood flow and is often associated with endothelial dysfunction and inflammation, both of which contribute to elevated blood pressure. The kidneys also play a critical role in blood pressure regulation through their control of sodium balance. Impaired renal sodium excretion can result in volume expansion, meaning there is more fluid in the blood vessels, which raises blood pressure [8]. This process is tightly linked to the activation of the renin-angiotensin-aldosterone system (RAAS), a key regulator of blood pressure. Overactivation of RAAS leads to sodium retention and vasoconstriction, both of which contribute to sustained hypertension. In addition, chronic overactivity of the sympathetic nervous system can play a significant role in the development of hypertension. This system, responsible for the body's "fight or flight" response, increases heart rate and constricts blood vessels, raising vascular tone. When the sympathetic nervous system is persistently activated, it results in long-term increases in blood pressure. Together, these mechanisms contribute to the development and maintenance of hypertension, underscoring the importance of understanding its multifactorial nature in order to manage and treat the condition effectively [9].

3. Prevalence and Risk Factors

Hypertension is one of the most prevalent chronic conditions worldwide, with its prevalence steadily increasing in both developed and developing countries. The World Health Organization (WHO) estimates that around 1.13 billion people live with hypertension globally, and its rates vary significantly across different regions. High-income countries generally report the highest prevalence of hypertension, likely due to lifestyle factors and increased life expectancy. As urbanization and aging populations grow in low- and middle-income countries, these areas are also experiencing rising rates of hypertension. Several risk factors contribute to the development and progression of hypertension, including both modifiable and non-modifiable factors. Age is a significant non-modifiable risk factor, as the likelihood of developing hypertension increases with age, particularly in individuals over the age of 60. This is partly due to the natural stiffening of blood vessels that occurs as part of the aging process [10].

Genetics also play an important role in hypertension, with a family history of high blood pressure increasing an individual's risk. Certain genetic variations can predispose individuals to higher blood pressure, making genetics an important factor to consider in hypertension management and prevention. Diet is another crucial factor influencing blood pressure. Diets that are high in sodium and low in essential minerals such as potassium, calcium, and magnesium are strongly associated with elevated blood pressure. Poor dietary habits, particularly excessive salt intake, contribute to fluid retention, which increases blood volume and subsequently raises blood pressure. Obesity, particularly excess visceral fat, is another major risk factor [11]. Excess weight strains the cardiovascular system, impacts renal function, and triggers systemic inflammation, all of which contribute to the development of hypertension. Furthermore, a sedentary lifestyle exacerbates this issue by promoting weight gain and insulin resistance, both of which are linked to increased blood pressure. Smoking and excessive alcohol consumption are also significant risk factors. Smoking damages blood vessels, leading to increased resistance to blood flow, while alcohol can raise blood pressure through its effects on the nervous system and by causing fluid retention. Finally, chronic stress is a psychological factor that can contribute to hypertension. Persistent stress activates the sympathetic nervous system, leading to increased heart rate and blood vessel constriction, which in turn raises blood pressure. Managing stress through relaxation techniques and lifestyle modifications is crucial in mitigating hypertension risk. Understanding these risk factors is essential in developing strategies for the prevention, management, and treatment of hypertension globally [12].

4. Diagnosis of Hypertension

The diagnosis of hypertension is primarily based on blood pressure measurement, which is typically performed in a clinical setting using either a sphygmomanometer or an automated blood pressure cuff. According to the American College of Cardiology (ACC) and the American Heart Association (AHA) guidelines, hypertension is diagnosed when blood pressure readings consistently exceed 140/90 mmHg. This threshold is critical for determining whether an individual has hypertension and requires further management. For accurate diagnosis, blood pressure should be measured on at least two separate occasions, with the patient at rest to avoid temporary fluctuations. To ensure the diagnosis is precise, it is important that the measurements are taken under consistent conditions. In cases where a patient shows elevated blood pressure only in a clinical setting, a condition known as white-coat hypertension, further monitoring may be required [13]. Ambulatory blood pressure monitoring (ABPM), where blood pressure is measured over a 24-hour period in the patient's daily environment, or home blood pressure monitoring (HBPM), can provide a more accurate representation of blood pressure outside the clinical environment. In addition to regular blood pressure measurements, further diagnostic tests are often recommended to evaluate the presence of any underlying conditions or complications associated with hypertension. An electrocardiogram (ECG) can be used to assess for cardiac arrhythmias or signs of left ventricular hypertrophy, which may result from prolonged high blood pressure [14]. Urine analysis and blood tests are also useful to check kidney function and to identify secondary causes of hypertension, such as hyperaldosteronism or pheochromocytoma, which are rare but treatable causes of elevated blood pressure. An echocardiogram may also be performed to evaluate any signs of cardiac damage caused by sustained hypertension, providing additional insights into the impact of the condition on heart health. These diagnostic steps are essential to confirm the diagnosis of hypertension and assess any potential underlying causes or complications [15-20].

5. Management of Hypertension

The management of hypertension is a critical aspect of reducing the risk of serious cardiovascular and renal complications. A well-rounded approach to hypertension management involves both non-pharmacological and pharmacological strategies aimed at lowering blood pressure to a target of below 130/80 mmHg, as recommended by the latest guidelines. Effective treatment not only helps in controlling blood pressure but also improves overall health outcomes, reducing the likelihood of conditions such as heart attack, stroke, heart failure, and kidney disease [20-25].

Non-Pharmacological Strategies:

The foundation of hypertension management lies in lifestyle modifications, which play a significant role in controlling blood pressure. The first and most impactful change involves dietary adjustments. One of the most well-researched and effective dietary plans for hypertension is the DASH (Dietary Approaches to Stop Hypertension) diet. The DASH diet emphasizes the consumption of fruits, vegetables, whole grains, and low-fat dairy products while minimizing sodium intake. Studies have consistently shown that following the DASH diet can significantly reduce blood pressure and improve cardiovascular health. Regular physical activity is another cornerstone of hypertension management [25-28]. Engaging in aerobic exercises such as walking, jogging, swimming, or cycling can lower blood pressure by improving vascular function, increasing blood flow, and reducing body weight. Exercise also promotes the release of endorphins, which help reduce stress and lower blood pressure. For individuals who are overweight or obese, weight loss is particularly effective in managing hypertension. Losing excess weight, even modestly, can significantly decrease blood pressure, especially in obese individuals. Stress management is also a critical component of controlling hypertension. Chronic stress activates the sympathetic nervous system, which can lead to sustained increases in blood pressure. Techniques like meditation, yoga, and deep breathing exercises can help activate the parasympathetic nervous system, thereby reducing the activity of the sympathetic nervous system and lowering blood pressure. Additionally, quitting smoking and moderating alcohol consumption are crucial. Smoking damages blood vessels, contributing to increased resistance and elevated blood pressure, while excessive alcohol intake can also raise blood pressure. Therefore,

cessation of smoking and limiting alcohol consumption are important for improving blood pressure control [28-30].

Pharmacological Treatment:

When lifestyle changes alone are insufficient to control blood pressure, pharmacological treatment may be necessary. Diuretics are often prescribed as the first-line treatment for hypertension. These medications work by promoting the excretion of excess sodium and fluid through the kidneys, which reduces blood volume and lowers blood pressure. Thiazide diuretics are commonly used and have been shown to be highly effective in reducing blood pressure. Angiotensin-Converting Enzyme (ACE) inhibitors and Angiotensin Receptor Blockers (ARBs) are also frequently used in the treatment of hypertension. Both types of medications target the renin-angiotensin-aldosterone system (RAAS), a hormonal system that plays a significant role in regulating blood pressure [31]. ACE inhibitors block the enzyme that converts angiotensin I to angiotensin II, a powerful vasoconstrictor, while ARBs block the angiotensin II receptors, leading to vasodilation and reduced blood pressure. Calcium Channel Blockers (CCBs) are another class of medications commonly used to treat hypertension. These drugs relax blood vessels by inhibiting the entry of calcium into smooth muscle cells, leading to vasodilation and lower blood pressure. In addition to reducing vascular resistance, CCBs also lower heart rate, which further contributes to blood pressure control. Beta-blockers are another type of medication used to treat hypertension [32]. These drugs work by blocking the effects of the hormone epinephrine (adrenaline) on beta receptors, which reduces heart rate and cardiac output, resulting in lower blood pressure. Beta-blockers are especially useful in individuals who also have a history of heart disease, as they can reduce the risk of heart attacks and other cardiovascular events. For patients who do not respond to standard medications, other agents such as alpha-blockers, renin inhibitors, and direct vasodilators may be considered. These medications can be particularly useful for individuals with treatment-resistant hypertension, where more traditional treatments have not been effective in achieving adequate blood pressure control [33].

Emerging Therapies:

In addition to the well-established treatment options, there are several emerging therapies that show promise for the future management of hypertension, particularly for those with treatment-resistant hypertension. One such treatment is renal denervation, a minimally invasive procedure that targets the renal nerves to reduce sympathetic nervous system activity. This procedure has been shown to reduce blood pressure in some individuals by disrupting the neural pathways that contribute to hypertension [33-35]. Gene therapy and personalized medicine are other promising areas of research. Advances in genetics and biotechnology may eventually lead to more tailored treatments for hypertension based on an individual's genetic makeup and specific pathophysiological mechanisms. These therapies could allow for more effective and targeted interventions, potentially reducing side effects and improving long-term outcomes for patients with hypertension [35-40].

6. Conclusion

Hypertension remains one of the most significant global health challenges, affecting millions of individuals worldwide. Its silent progression, often without symptoms, makes it particularly dangerous, as many individuals are unaware they have high blood pressure until severe complications arise. These complications can include cardiovascular diseases such as heart attacks, strokes, and heart failure, as well as kidney damage, which can lead to chronic kidney disease and eventual kidney failure. The wide-ranging effects of hypertension on cardiovascular and kidney health make it a key contributor to morbidity and mortality globally. Early diagnosis of hypertension is essential in preventing these devastating outcomes. Regular blood pressure monitoring, particularly in at-risk populations, is crucial for detecting high blood pressure early. Once diagnosed, lifestyle modifications play a vital role in managing the condition. Dietary changes, such as adopting the DASH diet, reducing sodium intake, increasing physical activity, and maintaining a healthy weight, have all been shown to effectively lower blood pressure. Additionally, stress management techniques like meditation and yoga can help reduce the physiological impact of stress on blood pressure. For individuals who do not

achieve adequate blood pressure control through lifestyle changes alone, pharmacological treatments are necessary. Medications such as diuretics, ACE inhibitors, ARBs, and calcium channel blockers are commonly prescribed to help manage hypertension. These medications, often in combination, work by targeting various mechanisms that regulate blood pressure, helping to reduce the risk of cardiovascular and kidney-related complications. As our understanding of hypertension continues to advance, emerging therapies, such as renal denervation and gene therapy, offer hope for more effective and targeted treatments. Personalized approaches, based on an individual's genetic profile and unique health needs, may lead to more precise and successful management strategies. With continued efforts in prevention, public health education, and medical advancements, the global burden of hypertension can be reduced. By focusing on early detection, effective treatment, and the promotion of healthier lifestyles, we can enhance the quality of life for millions of individuals affected by hypertension, ultimately improving global health outcomes.

7. References

1. Zehravi M, Maqbool M, Ara I. Polycystic ovary syndrome and infertility: an update. *International journal of adolescent medicine and health*. 2021 Jul 22;34(2):1-9.
2. Lihite RJ, Lahkar M, Das S, Hazarika D, Kotni M, Maqbool M, Phukan S. A study on adverse drug reactions in a tertiary care hospital of Northeast India. *Alexandria journal of medicine*. 2017 Jul 11;53(2):151-6.
3. Zehravi M, Maqbool M, Ara I. Correlation between obesity, gestational diabetes mellitus, and pregnancy outcomes: an overview. *International Journal of Adolescent Medicine and Health*. 2021 Jun 18;33(6):339-45.
4. Maqbool M, Bekele F, Fekadu G. Treatment strategies against triple-negative breast cancer: an updated review. *Breast Cancer: Targets and Therapy*. 2022 Jan 11:15-24
5. Rasool S, Maqbool M. An overview about *Hedychium spicatum*: a review. *Journal of Drug Delivery and Therapeutics*. 2019 Feb 15;9(1-s):476-80.
6. Zehravi M, Maqbool M, Ara I. Depression and anxiety in women with polycystic ovarian syndrome: a literature survey. *International Journal of Adolescent Medicine and Health*. 2021 Aug 23;33(6):367-73.
7. Maqbool M, Gani I, Dar MA. Anti-diabetic effects of some medicinal plants in experimental animals: a review. *Asian Journal of Pharmaceutical Research and Development*. 2019 Feb 15;7(1):66-9.
8. Zehravi M, Maqbool M, Ara I. Polycystic ovary syndrome and reproductive health of women: a curious association. *International journal of adolescent medicine and health*. 2021 Apr 21;33(6):333-7.
9. Mohd M, Maqbool M, Dar MA, Mushtaq I. Polycystic ovary syndrome, a modern epidemic: an overview. *Journal of Drug Delivery and Therapeutics*. 2019 May 15;9(3):641-4.
10. Maqbool M, Fekadu G, Jiang X, Bekele F, Tolossa T, Turi E, Fetensa G, Fanta K. An up to date on clinical prospects and management of osteoarthritis. *Annals of Medicine and Surgery*. 2021 Dec 1;72:103077.
11. Majeed A, Bashir R, Farooq S, Maqbool M. Preparation, characterization and applications of nanoemulsions: An insight. *Journal of Drug Delivery and Therapeutics*. 2019 Mar 15;9(2):520-7.
12. Zehravi M, Maqbool M, Ara I. Healthy lifestyle and dietary approaches to treating polycystic ovary syndrome: a review. *Open Health*. 2022 May 2;3(1):60-5.
13. Maqbool R, Maqbool M, Zehravi M, Ara I. Menstrual distress in females of reproductive age: a literature review. *International journal of adolescent medicine and health*. 2021 Jul 22;34(2):11-7.

14. Ara I, Maqbool M, Fekadu G, Hajam TA, Dar MA. Pharmaceutical significance of *Nigella sativa* L., a wonder herb. *Journal of Applied Pharmaceutical Sciences and Research*. 2020;3(4):04-13.
15. Maqbool M, Nasir N, Mustafa S. Polycystic in ovarian syndrome and its various treatment strategies. *INDO AMERICAN JOURNAL OF PHARMACEUTICAL SCIENCES*. 2018 Sep 1;5(9):8470-8.
16. Maqbool M, Zehravi M, Maqbool R, Ara I. Study of adverse drug reactions in pulmonary medicine department of a Tertiary care hospital, Srinagar, Jammu & Kashmir, India. *CELLMED*. 2021;11(2):8-1.
17. Ara I, Maqbool M, Bukhari B, Ara N, Hajam TA. Present status, standardization and safety issues with herbal drugs. *International Journal of Research in Pharmaceutical Sciences and Technology*. 2020 May 18;1(3):95-101.
18. Ara I, Maqbool M, Gani I. Reproductive Health of Women: implications and attributes. *International Journal of Current Research in Physiology and Pharmacology*. 2022 Nov 28:8-18.
19. Zehravi M, Maqbool R, Maqbool M, Ara I. To Identify Patterns of Drug Usage among Patients Who Seek Care in Psychiatry Outpatient Department of a Tertiary Care Hospital in Srinagar, Jammu and Kashmir, India. *Journal of Pharmaceutical Research International*. 2021 Jun 10;33(31A):135-40.
20. Maqbool M, Javed S, Bajwa AA. Assessment OF pain management IN postoperative cases using different scales and questionnaires. *INDO AMERICAN JOURNAL OF PHARMACEUTICAL SCIENCES*. 2019 Jan 1;6(1):983-7.
21. Ara I, Maqbool M, Zehravi M. Psychic consequences of infertility on couples: A short commentary. *Open Health*. 2022 Jan 1;3(1):114-9.
22. Bashir R, Maqbool M, Ara I, Zehravi M. An In sight into Novel Drug Delivery System: In Situ Gels. *CELLMED*. 2021;11(1):6-1.
23. Zehravi M, Maqbool M, Ara I. Teenage menstrual dysfunction: an overview. *International Journal of Adolescent Medicine and Health*. 2022 Sep 19;35(1):15-9.
24. Ara I, Zehravi M, Maqbool M, Gani I. A review of recent developments and future challenges in the implementation of universal health coverage policy framework in some countries. *Journal of Pharmaceutical Research & Reports*. SRC/JPRSR-131. DOI: doi. org/10.47363/JPRSR/2022 (3). 2022;127.
25. Maqbool M, Shabbir W, Aamir S. Adverse events of blood transfusion and blood safety in clinical practice. *Indo American Journal Of Pharmaceutical Sciences*. 2018 Aug 1;5(8):8254-9.
26. Maqbool M, Naeem A, Aamer S. Diabetes mellitus and its various management strategies in practice. *Indo American Journal of Pharmaceutical Sciences*. 2018 Aug 1;5(8):8163-+.
27. Maqbool M, Tariq S, Amjad S. Prescribing practices in pediatrics and drug utilization studies promoting pediatric health. *Indo American Journal of Pharmaceutical Sciences*. 2018 Aug 1;5(8):8070-6.
28. Maqbool M, Ikram U, Anwar A. Adverse drug reaction monitoring and occurrence in drugs used in pulmonary disorders. *Indo American Journal Of Pharmaceutical Sciences*. 2018 Aug 1;5(8):8060-5.
29. Maqbool R, Maqbool M, Zehravi M, Ara I. Acute neurological conditions during pregnancy and their management: a review. *International Journal of Adolescent Medicine and Health*. 2021 Aug 23;33(6):357-66.
30. Zehravi M, Maqbool M, Ara I. An overview about safety surveillance of adverse drug reactions and pharmacovigilance in India. *The Indian Journal of Nutrition and Dietetics*. 2021 Jul:408-18.

31. Maqbool M, Zehravi M. Neuroprotective role of polyphenols in treatment of neurological disorders: A review. *Interventional Pain Medicine and Neuromodulation*. 2021 Dec 31;1(1).
32. Maqbool M, Ara I, Gani I. The Story of Polycystic Ovarian Syndrome: A Challenging Disorder with Numerous Consequences for Females of Reproductive Age. *International Journal of Current Research in Physiology and Pharmacology*. 2022 Nov 28:19-31.
33. Maqbool M, Gani I. Utilization of statins in reducing comorbidities of diabetes mellitus: A systematic review. *Journal of Pharmacy Practice and Community Medicine*. 2018;4(4).
34. Maqbool R, Maqbool M, Zehravi M, Ara I. Acute neurological conditions during pregnancy and their management: a review. *International Journal of Adolescent Medicine and Health*. 2021 Aug 23;33(6):357-66.
35. Maqbool M, Tariq S, Amjad S. Prescribing practices in pediatrics and drug utilization studies promoting pediatric health. *Indo American Journal of Pharmaceutical Sciences*. 2018 Aug 1;5(8):8070-6.
36. Maqbool M, Naeem A, Aamer S. Diabetes mellitus and its various management strategies in practice. *Indo American Journal of Pharmaceutical Sciences*. 2018 Aug 1;5(8):8163-+.
37. Maqbool M, Shabbir W, Aamir S. Adverse events of blood transfusion and blood safety in clinical practice. *Indo American Journal Of Pharmaceutical Sciences*. 2018 Aug 1;5(8):8254-9.
38. Qadrie Z, Maqbool M, Dar MA, Qadir A. Navigating challenges and maximizing potential: Handling complications and constraints in minimally invasive surgery. *Open Health*. 2025 Feb 5;6(1):20250059.
39. Oral O, Maqbool M, Thapa P, Tatlibal P, Enser M. The potential impact of weight control management on metabolic health during healthy aging. *Global Translational Medicine*. 2025 Jan 13:4815.
40. Maqbool M, Oral O. Implications of hypothyroidism in females of reproductive age: a review of current literature.