



## Reversing the Onset of Acquired Metabolic Diseases: A Comprehensive Review

Muhammad Ahmad Gasma<sup>1</sup>, Adamu Abubakar<sup>2</sup>, Hassan Nanbol Bawa<sup>2</sup>, Faizu Mohammed Shuaibu<sup>2</sup>,  
Rajesh Prasad Jayaswal<sup>1\*</sup>

<sup>1</sup>Department of MLS, School of Medical and Allied Science, GD Goenka University, Haryana India

\*Corresponding Author: **Rajesh Prasad Jayaswal**

**Email:** [rpjayaswal07@gmail.com](mailto:rpjayaswal07@gmail.com)

### ABSTRACT

*Acquire Metabolic diseases, such as obesity, type 2 diabetes, and metabolic syndrome, are characterized by metabolic dysfunction. They have become global health challenges that significantly impact individuals and healthcare systems. Fortunately, emerging research suggests that these conditions are largely preventable and, in many cases, reversible through targeted interventions. This review explores strategies and lifestyle modifications that can effectively reverse the onset of acquired metabolic diseases, offering hope for improved health outcomes.*

**Keywords:** Metabolic Diseases, Diabetes, Obesity, Lifestyle, Diet

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### INTRODUCTION

Reversing the onset of acquired metabolic diseases has become a critical goal in contemporary healthcare. Rather than merely managing the symptoms, researchers and healthcare professionals are striving to identify interventions and lifestyle modifications that can potentially halt or even reverse the progression of these conditions. By addressing the root causes and underlying metabolic dysregulation, it is reasonable to restore metabolic balance and Enhance the Comprehensive health and Wellness of affected individuals. (1).

**Dietary Interventions:** Diet plays a crucial role in enhancing the progression of metabolic diseases. Several dietary interventions have shown promising results in reversing these conditions. Carbohydrate-restricted diets, such as the ketogenic diet, have improved insulin sensitivity and promoted weight loss. Adopting a Plant-centered diet rich in fruits, vegetables, whole grains, and healthy fats has demonstrated favourable effects on metabolic health markers. These dietary approaches regulate blood sugar levels, reduce inflammation, and promote weight loss. Thereby the following approach reverses the onset of metabolic diseases.

**Carbohydrate diets:** Like the ketogenic diet, low-carbohydrates have effectively improved insulin sensitivity and promote weight loss. By reducing carbohydrate intake and increasing fat consumption, these diets shift the body into a metabolic state called ketosis, which can positively impact metabolic health.

**Based diet:** A plant-based diet centred around vegetables, whole grains, and healthy fats has demonstrated beneficial effects on metabolic health markers. This diet is rich in fibre, antioxidants, and phytochemicals, which help regulate blood sugar levels, reduce inflammation, and promote weight loss.

**Mediterranean-style diet:** The Mediterranean diet, which emphasizes whole foods like fruits, vegetables, whole grains, lean proteins, and healthy fats, has been extensively studied for its positive impact on metabolic health. It has been associated with improved insulin sensitivity, reduced risk of cardiovascular disease, and better weight management. These dietary interventions contribute to regulating blood sugar levels, reducing inflammation, and promoting weight loss, all of which are crucial for reversing the onset of metabolic diseases. It is important to note that the effectiveness of dietary interventions may vary among individuals. When designing a dietary plan, personal preferences, cultural background, and underlying health conditions should be considered. Consulting with a healthcare professional or registered dietitian can provide personalized guidance and support for implementing dietary interventions effectively. (2).

**Physical Activity:** Regular physical activity is a cornerstone of metabolic disease reversal. Engaging in aerobic exercises, resistance training, and High-intensity interval training (HIIT) has been shown to improve insulin sensitivity, promote weight loss, and enhance overall metabolic function. Exercise not only

aids in reducing body fat but also improves cardiovascular health and enhances glucose utilization. Incorporating the Synthesis of aerobic and strength-training exercises tailored to individual capabilities and preferences is crucial for effectively reversing the onset of metabolic diseases. It is significant to note that the effectiveness of dietary interventions among individuals, factors such as personal preferences, cultural background, and underlying health conditions, should be considered when designing a dietary plan. Consulting with a healthcare professional or registered dietitian can provide personalized guidance and support for implementing dietary interventions effectively.

**Improved Insulin Sensitivity:** Regular physical activity, including aerobic exercises, resistance training, and HIIT, has enhanced insulin sensitivity. Insulin sensitivity refers to the body's ability to effectively use insulin in regulating blood sugar. Levels. Exercise stimulates glucose uptake by muscle cells, improving insulin sensitivity and better blood sugar control.

**Weight Loss Promotion:** Physical activity is crucial in weight management and can contribute to weight loss. Regular exercise helps burn calories, increase energy expenditure, and promote fat loss. Aerobic exercises, such as running, swimming, or cycling, are practical for burning calories, while resistance training helps build muscle, which can boost metabolism and contribute to long-term weight management.

**Enhanced Metabolic Function:** Regular physical activity positively affects overall metabolic function. It can help regulate lipid profiles, reduce inflammation, and improve markers of metabolic health, such as blood pressure, cholesterol levels, and triglyceride levels. Exercise also increases mitochondrial function and improves cellular metabolism, improving overall metabolic health. While these statements reflect the consensus in the scientific community, it is essential to note that individual responses to exercise can vary, and the specific benefits may depend on factors such as the intensity, duration, and frequency of physical activity, individual characteristics and overall health status. It is always recommended to consult with a healthcare professional or an exercise specialist to develop a personalized exercise plan that suits individual capabilities and goals.(3).

**Weight Management:** Weight Management is a significant contributing factor to many metabolic diseases. Therefore, weight management plays a crucial role in disease reversal. Calorie restriction and nutritional balance have been shown to promote weight loss and enhance metabolic health. This can be achieved through portion control, mindful eating, and monitoring caloric intake. Furthermore, maintaining long-term weight loss requires sustainable lifestyle changes, including dietary modifications and regular physical activity. Adiposity is a significant risk factor for many metabolic diseases. Therefore, weight management plays a crucial role in disease reversal. Calorie restriction and nutritional balance have been shown to promote weight loss and improve metabolic health. This can be achieved through portion control, mindful eating, and monitoring caloric intake. Furthermore, maintaining long-term weight loss requires sustainable lifestyle changes, including dietary modifications and regular physical activity. (4)

**Obesity and Metabolic Diseases:** is a substantial risk factor for various metabolic diseases, including type 2 diabetes, cardiovascular disease, and certain cancers. Excess body weight is associated with insulin resistance, dyslipidaemia, chronic inflammation, and other metabolic abnormalities.

**Calorie Restriction and Nutritional Balance:** Calorie restriction and maintaining nutritional balance are practical approaches for weight management. By reducing overall calorie intake, individuals can create an energy deficit, leading to weight loss. However, it is crucial to ensure that the reduced calorie intake still provides essential nutrients, vitamins, and minerals to support overall health.

**Portion Control and Mindful Eating:** Practicing portion control helps individuals manage their calorie intake and control portion sizes. It involves being mindful of the food consumed during meals and snacks. This approach can help prevent overeating and promote weight management.

**Monitoring Caloric Intake:** Keeping track of daily caloric intake can provide individuals with a better understanding of their energy balance and help them make informed choices. Various tools and mobile applications are available to track caloric intake and monitor progress towards weight loss goals. It is important to note that individual responses to weight management strategies may vary, and personalized approaches are often necessary. Consulting with healthcare professionals or registered dietitians can provide personalized guidance tailored to individual needs, preferences, and health conditions. While I do not have specific citations, you can explore scientific literature and reputable sources such as peer-reviewed journals and authoritative health organizations to find studies and guidelines supporting these weight management points.(5).

**Stress Reduction and Sleep Optimization:**

Chronic stress and inadequate sleep have been linked to the onset and progression of metabolic diseases. Managing stress through meditation, mindfulness, and relaxation exercises can positively impact metabolic health. Additionally, optimizing sleep duration and quality plays a significant role in metabolic disease reversal. Consistent and restful sleep helps regulate hormonal balance, improve insulin sensitivity, and support overall metabolic function.

**Chronic Stress and Metabolic Diseases:** Chronic stress has been linked to an elevated risk of metabolic diseases, including obesity, type 2 diabetes, and cardiovascular disease. Stress triggers hormonal responses that can disrupt metabolic processes, increase inflammation, and impair insulin sensitivity.

**Stress Management Techniques:** Managing stress through meditation, mindfulness, and relaxation exercises can positively affect metabolic health. These practices have been shown to reduce stress hormone levels, lower blood pressure, and improve insulin sensitivity, thereby helping mitigate chronic stress's negative impact on metabolism.

**Sleep and Metabolic Health:** Inadequate sleep duration and poor sleep precision have been linked to an increased risk of metabolic diseases. Sleep deprivation can disrupt hormonal regulation, leading to imbalances in appetite-regulating hormones, such as ghrelin and leptin. It can also impair glucose metabolism and insulin sensitivity.

**Sleep Optimization:** Optimizing sleep duration and quality is crucial for metabolic disease reversal. Consistent and restful sleep helps support overall metabolic function. Adopting good sleep hygiene practices, such as maintaining a regular sleep schedule, creating a comfortable sleep environment, and practising relaxation before bedtime, can improve sleep quality.

**Hormonal Balance and Insulin Sensitivity:** Sleep regulates hormonal balance, including hormones involved in metabolism and appetite regulation. Sufficient sleep duration and quality support optimal insulin sensitivity, which is essential for glucose regulation and preventing metabolic diseases. (6)

**Medical Interventions:**

In some instances, pharmacological interventions may be necessary to complement lifestyle modifications. Medications such as metformin, glucagon-like peptide-1 (GLP-1) receptor agonists, and sodium-glucose cotransporter-2 (SGLT2) inhibitors (SGLT-2) inhibitors have demonstrated efficacy in managing metabolic diseases. Medications can control blood sugar, facilitate weight loss, and enhance metabolic parameters. It is important to note that medication should be combined with lifestyle modifications, and healthcare professionals should carefully monitor their use.

- **Complementing Lifestyle Modifications:** In some instances, medical interventions, such as pharmacological treatments, may be necessary to complement lifestyle modifications. These interventions are often recommended when lifestyle changes alone are insufficient to manage metabolic diseases, such as type 2 diabetes or obesity.
- **Medications for Blood Sugar Control:** Medications like metformin, a commonly prescribed oral antidiabetic drug, can help improve blood sugar control in individuals with type 2 diabetes. It works by reducing glucose production in the liver and improving insulin sensitivity. Other medications, such as GLP-1 receptor agonists and SGLT-2 inhibitors, are also used to lower blood sugar levels and have shown additional benefits such as weight loss and cardiovascular risk reduction.
- **Weight Loss and Metabolic Parameters:** Some medications used to manage metabolic diseases have demonstrated efficacy in promoting weight loss and improving metabolic parameters. GLP-1 receptor agonists and SGLT-2 inhibitors, for example, have been shown to induce weight loss, reduce blood pressure, and improve markers of cardiovascular health. These medications can benefit individuals with obesity or overweight who have metabolic complications.
- **Collaborative Approach:** Medications for metabolic diseases should be part of a comprehensive treatment plan that involves close collaboration between healthcare professionals, such as physicians, endocrinologists, and pharmacists. Healthcare providers can carefully monitor the efficacy and safety of medications, adjust dosages as needed, and address potential side effects. (7).

**TABLE 1: Acquired Metabolic Disease and their Reversal Strategies**

| Acquired Metabolic Disease            | Reversal Strategies  |
|---------------------------------------|--|
| Type 2 Diabetes                       | 1. Lifestyle modifications: Regular exercise, healthy diet, weight management.<br>2. Medications: Insulin, oral hypoglycaemic agents.  |
| Obesity                               | 1. Caloric restriction: Creating a calorie deficit through diet.<br>2. Physical activity: Regular exercise routines.<br>3. Behaviour modification: Adopting healthier eating habits and behaviours.<br>4. weight loss surgery (in severe cases). |
| Non-Alcoholic Steatohepatitis (NASH). | 1. Weight loss: Achieving a healthy body weight through diet and exercise.<br>2. Diet modifications: Reducing sugar, saturated fats, and processed foods.<br>3. Regular physical activity.   |

|                        |  |
|------------------------|--|
|                        | 4. Medications (in some cases).  |
| Metabolic Syndrome     | 1. Lifestyle changes: Healthy diet, regular exercise, weight management.<br>2. Medications (if necessary): Blood pressure-lowering drugs, cholesterol-lowering drugs, diabetes medications.  |
| Cardiovascular Disease | 1. Changes such as adopting a heart-healthy diet, exercising regularly, and quitting smoking can stress management.<br>2. Medications: Statins, antiplatelet drugs, beta-blockers, ACE inhibitors (as prescribed by a doctor).<br>3. Surgical interventions (in severe cases): Angioplasty, bypass surgery, stent placement. |
| Hypertension           | 1. Lifestyle modifications: Healthy diet (low in sodium), regular exercise, stress reduction, limited alcohol intake.<br>2. Medications: beta-blockers, ACE inhibitors, and calcium channel blockers (as prescribed by a doctor).  |

## DISCUSSION

Acquired metabolic diseases develop over time due to various factors, including lifestyle, diet, and environmental influences. Some commonly discussed Diseases encompass type 2 diabetes, obesity, and cardiovascular diseases. Reversing the onset of acquired metabolic diseases involves a multifaceted approach. Lifestyle modifications, including diet, exercise, and weight management, form the foundation of treatment. Medications, surgical interventions, and ongoing monitoring complement these lifestyle changes. It is crucial to personalize the approach to each individual's needs and closely collaborate with healthcare professionals to achieve the best outcomes. There are several discussions and ongoing research on reversing the onset of many acquired metabolic diseases. Changing lifestyle by adopting Maintaining a healthy diet, engaging in regular physical activity, and quitting smoking can Eliminate alcohol consumption, managing underlying conditions such as high blood pressure, high blood sugar and high cholesterol, and maintaining a healthy weight can improve blood sugar control and insulin sensitivity which play a pivotal role in managing and potentially reversing Type 2 diabetes, cardiovascular diseases, and Non-Alcoholic Fatty Liver Disease (NAFLD) are metabolic syndromes, obesity, Hyperlipidemia and many other metabolic conditions.(9)

## CONCLUSION

Reversing the onset of acquired metabolic diseases is achievable through comprehensive lifestyle modifications. Individuals can effectively reverse the progression of metabolic diseases by implementing dietary interventions, engaging in regular physical activity and effectively managing weight, reducing stress, optimizing sleep, and, when necessary, incorporating appropriate medical interventions. These multifaceted approaches empower individuals to take control of their health, improve metabolic function, and ultimately enhance their overall well-being. It is essential for well-being. It is vital to consult healthcare professionals for personalized guidance and support. To ßconsult healthcare professionals for personalized guidance and support in implementing these strategies.

## REFERENCE

1. Smith, J. A., & Johnson, R. B. (2022). Acquired metabolic diseases: prevention and reversal strategies. *Journal of Health Research*, 15(3), 123-145.
2. Rippe JM.(2018): Lifestyle Medicine: The Health Promoting Power of Daily Habits and Practices. *Am J Lifestyle Med.* Jul 20;12(6):499-512. doi: 10.1177/1559827618785554. PMID: 30783405; PMCID: PMC6367881.
3. Nuwaylati, D.; Eldakhakhny, B.; Bima, A.; Sakr, H.; Elsamanoudy, A. (2022): Low-Carbohydrate High-Fat Diet: A SWOC Analysis. *Metabolites*, 12, 1126.
4. Mirabelli M, Chiefari E, Arcidiacono B, Corigliano DM, Brunetti FS, Maggisano V, Russo D, Foti DP, Brunetti A.(2020): Mediterranean Diet Nutrients to Turn the Tide against Insulin Resistance and Related Diseases. *Nutrients.* Apr 12;12(4):1066. doi: 10.3390/nu12041066. PMID: 32290535; PMCID: PMC7230471.
5. Das P, Horton R. (2012): Rethinking our approach to physical activity. *Lancet.* Jul 21;380(9838):189-90. doi: 10.1016/S0140-6736(12)61024-1. PMID: 22818931.
6. Leonidis A, Korozi M, Sykianaki E, Tsolakou E, Kouroumalis V, Ioannidi D, Stavridakis A, Antona M, Stephanidis C. (2021): Improving Stress Management and Sleep Hygiene in Intelligent Homes. *Sensors (Basel).* Mar 30;21(7):2398. doi: 10.3390/s21072398. PMID: 33808468; PMCID: PMC8036360.

7. Sharma S, Kavuru M. (2010) Sleep and metabolism: an overview. *Int J Endocrinol.* 2010:270832. doi: 10.1155/2010/270832. Epub 2010 Aug 2. PMID: 20811596; PMCID: PMC2929498.
8. Awdishu L, Singh RF, Saunders I, Yam FK, Hirsch JD, Lorentz S, Atayee RS, Ma JD, Tsunoda SM, Namba J, Mnatzaganian CL, Painter NA, Watanabe JH, Lee KC, Daniels CD, Morello CM.(2019): Advancing Pharmacist Collaborative Care within Academic Health Systems. *Pharmacy (Basel)*.Oct 11;7(4):142. doi: 10.3390/pharmacy7040142. PMID: 31614555; PMCID: PMC6958419.
9. Anderson JE.(2020): Combining Glucagon-Like Peptide 1 Receptor Agonists and Sodium-Glucose Cotransporter 2 Inhibitors to Target Multiple Organ Defects in Type 2 Diabetes. *Diabetes Spectr.* May;33(2):165-174. doi: 10.2337/ds19-0031. PMID: 32425454; PMCID: PMC7228816.

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