

# Unveiling the Global Surge: Unraveling the Factors Fueling the Spread of Karoshi Syndrome

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**Abstract:** Karoshi syndrome, also known as “death by overwork”, has been a topic of study and concern in Japan since the 1980s. World Health Organization (WHO) and International Labour Organization (ILO) joint unveiled that in 2021, approximately 750,000 deaths due to Karoshi syndrome globally. The joint defined long working as having > 55 h work/week. Karoshi nowadays is no longer limited to Japan and has become a global issue. Karoshi is primarily attributed to factors such as long working hours, job-related stress, and poor work-life balance. This perspective was sought to provide a short overview of Karoshi syndrome, the underlying mechanisms and the state-of-art preventive measures.

**Keywords:** Karoshi syndrome, working overload, cardiovascular diseases, stroke

## Introduction

Karoshi syndrome, also known as “death by overwork”, has been a topic of study and concern in Japan since the 1980s. World Health Organization (WHO) and International Labour Organization (ILO) joint unveiled that in 2021, approximately 750,000 deaths due to Karoshi syndrome globally. The joint defined Karoshi syndrome as having > 55 h work/week.<sup>1</sup> Karoshi, a term originating from Japan, refers to death resulting from overwork and excessive occupational stress. This phenomenon gained marked attention due to its implications for both public health and workplace policies. The concept emerged in the context of Japan’s rigorous work culture, where long working hours, intense pressure, and limited work-life balance prevail.<sup>2</sup> It is characterized by extreme levels of stress and overwork, which can lead to serious consequences and even death. Karoshi is a potentially fatal syndrome resulting from long work hours. It is believed to be caused by the stimulation of disorders associated with chronic fatigue after performing high-stress work for a long time, such as cerebrovascular/cardiovascular diseases and mental disorders. Karoshi is not only a clinical disease but also a social issue, and it remains a complex problem for forensic science.<sup>3</sup> The Japanese government passed the “Act on Promotion of Preventive Measures against Karoshi and Other Overwork-Related Health Disorders” in 2014 to address the issue of karoshi and promote preventive measures. Karoshi can affect both entrepreneurs and workers in demanding and highly competitive work environments. Karoshi nowadays is no longer limited to Japan and has become a global issue.<sup>4</sup> It is important to recognize the signs of karoshi and take steps to address the problem and prevent it from affecting one’s health.

## Mechanisms of Karoshi Development

Karoshi is primarily attributed to factors such as long working hours, job-related stress, and poor work-life balance. The demanding nature of certain professions and societal expectations can lead to chronic stress and burnout. Factors like job insecurity, inadequate rest, and lack of control over work contribute to the development of physical and mental health issues.<sup>5</sup> The exact mechanism of death in cases attributed to karoshi is multifaceted and can involve a combination of physiological, psychological, and systemic factors. It’s important to note that karoshi is not recognized as a medical diagnosis in most countries, but rather a social phenomenon associated with death resulting from long working hours and excessive occupational stress.



**Figure 1** A collection of implicating mechanisms accounting for the mortality due to Karoshi syndrome.

Nevertheless, several mechanisms have been proposed to explain how overwork and stress can lead to serious health complications and potentially contribute to premature death.<sup>6</sup> These mechanisms include (also depicted in [Figure 1](#)):

1. **Cardiovascular Complications:** Prolonged exposure to chronic stress and overwork can contribute to the development of cardiovascular diseases. The stress response, characterized by elevated levels of stress hormones like cortisol and adrenaline, can lead to increased heart rate, blood pressure, and inflammation. Over time, these physiological changes can damage blood vessels, leading to atherosclerosis (buildup of plaque in arteries) and increasing the risk of heart attacks, strokes, and other cardiovascular events.<sup>7,8</sup>
2. **Hypertension:** Long working hours and high stress levels can lead to chronic hypertension (high blood pressure). Elevated blood pressure, if left untreated, can strain the heart and blood vessels, increasing the risk of heart disease and stroke.<sup>9</sup> Plus, an increase of the odds of intracerebral hemorrhage in hypertensive patients.<sup>10</sup>
3. **Sleep Deprivation and Exhaustion:** Overwork often leads to inadequate rest and sleep deprivation. Chronic sleep deficits can negatively impact overall health, impair cognitive function, weaken the immune system, and contribute to the development of various health issues.<sup>11</sup>
4. **Mental Health Implications:** The intense pressure and stress associated with overwork can lead to mental health disorders such as anxiety and depression. These conditions, if not addressed, can further exacerbate physical health issues and increase the risk of self-harm or suicide.<sup>12,13</sup> This is mostly experienced in information technology workers given that the modern life works are achieved online.<sup>14</sup> A study examined 1990 cases of mental disorders and suicide that received compensation (1371 men and 619 women) from January 2010 to March 2015. The rate of compensation was higher for workers aged 30 to 39 years. For men, the industries with higher rates of compensation were ‘accommodation/eating/drinking services’, ‘information/communication’ and ‘scientific research, professional and technical services’. In these sectors, the rate of compensation was especially high for workers aged 29 or younger.<sup>15</sup> ‘Long working hours’ caused most of the cases of mental disorders and suicide among men (55.7%) and were the main reason for suicide compensation. The frequency of these cases varied by industry and gender.
5. **Metabolic Disruptions:** Chronic stress can disrupt metabolic processes, potentially contributing to conditions like diabetes and obesity. These metabolic disturbances, when coupled with other health risks, can increase the likelihood of cardiovascular complications.<sup>5</sup>

6. Immune System Suppression: Prolonged stress can suppress the immune system, making individuals more susceptible to infections and other illnesses. This weakened immune response can lead to prolonged recovery times and increased vulnerability to health complications.<sup>16</sup>
7. Behavioral Factors: Long working hours might lead to unhealthy lifestyle choices, such as poor diet, lack of exercise, and inadequate self-care. These factors can contribute to the development of chronic diseases and further increase the risk of mortality.<sup>17</sup>

It is important to point out that while these mechanisms provide insights into how chronic overwork and stress can impact health, individual susceptibility, genetics, and other external factors also play significant roles in determining how these risks manifest. Additionally, societal and cultural factors influence the prevalence and impact of karoshi, particularly in work cultures where extended hours and limited work-life balance are the norm.

## Preventive Measures

Firstly, it is worth noting that Karoshi syndrome demonstrated non-success of this integration and is unsuccessful when the lean-based improvements themselves suffer from sustainability issues.<sup>18</sup> This should raise the awareness of both worker citizens and the employing establishments of such old work phenomenon. Efforts to address karoshi syndrome have led to the implementation of various preventive measures. In Japan, reforms aimed at promoting work-life balance, limiting overtime hours, and ensuring adequate rest have been introduced. Additionally, raising awareness about mental health issues and destigmatizing seeking help for stress-related problems are crucial components of preventive strategies.<sup>19</sup> Indeed, utilizing the already applicable remote work and the artificial intelligence arena shall alleviate the incidence of Karoshi syndrome further. Plus, some European countries such as Belgium shortened the working days into 4 instead of 5 a week to simultaneously limit the likelihood of working overload and increase the productivity of the employees.<sup>20</sup>

## Disclosure

The authors report no conflicts of interest in this work.

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