

## THE RELATIONSHIP BETWEEN STRESS AND STROKE RISK

**Dr. dr. Muhammad IsmanJusuf, Sp.S**

Study Program of Medicine  
Gorontalo State University

### 1.Introduction

The present development of modernization and globalization worldwide tends to increase the risk of vascular disease, including coronary heart disease and peripheral artery disease, including stroke. Stress can be one of the impacts of social change and is one of the consequences of modernization, which is ordinarily followed by the proliferation of technology, urbanization, and individual competition. This competition is the trait of society towards modernization. A large number of competitor in the field of education and job opportunity as well as the limited facility will generate many failure possibilities, and it will increase frustration, which can eventually create stress (Prawirohusodo, 1988). When the stress level is extremely high that exceeds the threshold, and there will be malfunctioning of one or several organs. Then, if the stress is prolonged, the previously functional disturbances will gradually turn into real and permanent organic disorders. Various stresses of life can lead to various forms of disease, including stroke. Research shows that emotional stress increases the stroke risk 1.5-2 times. (Hacinski, 2008).

### 2.Stress and Stroke Risk

In physics terminology, stress is defined as pressure or load. However, medical science defines it as the body's peculiar response to any stressful situation. Stress comprises 2 types, Distress, and Eustress. Distress is an unhealthy, negative, and destructive stress, while eustress is a healthy, positive, and constructive one. Negative stress causes life to be less excited, more indolent, and causes problems such as anxiety, depression, and physical problems. In the meantime, positive stress encourages person who is stressed to be more pro-active and spurs the mind to face the problems. Positive thoughts will actually make people better. Then, negative stress can be converted into positive stress (Atkinson et al., 2000).

The factor that causes stress is that when human's basic needs are not fulfilled, encompassing biology, love, security, belonging, respect, and self-actualization. Manifestations of stress include physical, mental, and social disorders. In detail, the physical disorders are sweating, headache, palpitation, dry mouth, stomach ache such as ulcer, and going to the toilet more often than usual. Then, the mental disorders include irritability, rude behavior, forgetfulness, insomnia, and loss of appetite for food, pleasure, or sex. Meanwhile, social disorders include not having time to pursue any hobbies, not being interested in other people, not being interested in personal appearance, and losing a sense of humor. The manifestation of stress in a person depends on the potential stressor, maturity, educational, physical condition, personality type, socio-culture, beliefs, religion, environment, and situation (Soewadi, 1997).

Factors causing stress is called by a stressor. In general, a stressor is distinguished into three groups as follows:

- Physical-biological stressor: cold, hot, infection, pain, blow/hit, and others
- Psychological stressor: fear, anger, disappointment, loneliness, falling in love, and others
- Sociocultural stressor: unemployment, divorce, dispute, competition, and others
- Stressor causing stress is commonly categorized into one or more following categories: traumatic event, uncontrollable event, and unpredictable event, an event which challenges limits and self-concept as well as internal conflict. The same stressor will react differently to different people. In addition, it is changeable or in line with human development. However, stress may happen anytime in life (Bahor, 1995; Asdie, 1997).

According to Cannon's (1929) theory, a physical disease, including stroke can be caused by impaired body function due to continuous stimulation. Then, a traumatic event can cause physiological reactions, and if these reactions do not obtain proper relief, they can cause disease (Prawirohusodo, 1997). The stress reaction theory from Selye (1956) states that physical and psychological stressors will result in a series of repetitive reactions, which is called general adaptation symptom, which consists of three stages: alarm reaction, resistance, and exhaustion. If stage 1 goes well, stage 2 will follow, where there will be an adjustment to the new environment caused by the stressor. The increase in resistance does not reduce adverse causes and effects of the stressors and are neutralized. On the other hand, if the effects caused by the stressor are not reduced or cannot be neutralized, then stage 3 will occur. At this stage, the available adaptability reserve in the organism runs out, thus various diseases will arise, including stroke.

Stress can activate pituitary-adrenal glands. This activation is through hypothalamic neuropeptide called Corticotropin Releasing Factor (CRF). The CRF will activate the pituitary, release Adrenocorticotrophic Hormone (ACTH) and stimulate the adrenal to produce cortisol. The ACTH and cortisol are indicators of stress, which can weaken the body's immune system. This situation will lead to the development of stroke (Putra, 1991; Ganung, 1995). Virgil Brown, M.D, chairman of the American Heart Association and professor of medical science at Emory University in Atlanta, states that stroke starts from hardening of arteries (arteriosclerosis) due to a stressful lifestyle. Furthermore, stress will trigger an increase in blood pressure and raise cholesterol in the blood. This condition causes blood vessels to become blocked, resulting in a stroke. The stress mechanism that causes stroke elucidates that stress is first accommodated by the five senses and will be transmitted to the emotional center in the central nervous system. Subsequently, stress will flow to the body organs via autonomic nervous system. The organ that is subject to stress, among others, is hormone gland, which is followed by a change in hormonal balance, which in turn will cause a functional change in various target organs, such as heart and blood vessel (Hawari, 1997).

Physical or psychological stress can stimulate the release of CRF, other stress hormones, and proinflammatory cytokines. Prolonged stress can lead to depression or anxiety, both of which can increase the production of proinflammatory cytokines, including interleukin 6 (IL-6). Increased IL-6 can increase CRF and other stress hormones and generate latent depression. Ischemia causes an increase in cytokines and anxiety in the patient and then becomes a vicious circle due to anxiety can increase cytokine production (Dentino et al., 1999). The stress-exposed group has the highest total risk of having a stroke due to the effect of stress on cerebral hemodynamic (Kadojic et al., 1999). Research also shows that emotional stress will increase stroke risk by 1.5-2 times (Hacinski, 2008). Psychologically, humans have different personality types. It is proven that people who have an aggressive nature have a high risk of hypertension and stroke.

A lot of scientific evidence shows that psychological factors, including psychological stress, have an effect on cardiovascular disease. INTERHEART's research is a case-control study involving participants from 52 countries, which measured semi-quantitative subjective perception of psychological stress. The findings signify a strong relationship with various aspects of stress, including financial stress, life stress, and others (Rosengren et al., 2004).

Several prospective and case-control studies have reported an existence of self-perceived severe psychological stress, various life stresses, and failure to obtain appropriate strategies for coping with stress independently is associated with increased stroke risk (Engstrom et al., 2004). By conducting subgroup analysis, several studies indicate a significant relationship between self-perceived psychological stress and fatal stroke (Öhlin et al., 2004). The relationship between severe self-perceived stress and stroke mortality rate is also found in studies conducted in Japan (Iso et al., 2002).

### 3. Stress Management

Everyone is susceptible to stress. At first, stress is not a health problem, but if it is not immediately addressed, it will be a trigger for the emergence of dangerous and even deadly diseases. To avoid stroke, everyone should manage stress. Stress management is the ability to control oneself when situation, people, and event are overly demanding. The goal is to identify the causes of stress and find out the techniques for managing them. According to Umama (2019), stress management technique consists of 4 steps, namely:

#### 1. Organizational Engineering

This technique is performed by changing the work environment to avoid any stressful one. According to Everly & Girdano, the steps that can be taken are setting a realistic goal, designing a planning tool, action, and method to achieve goal, creating a strategy to measure success, and measuring the success or achieved goal.

#### 2. Personal Engineering

This technique is performed by changing an individual's internal factors so that the tolerance to stress increases, the person can last longer in a stressful situation, and in the end, the person can maintain health. Stress tolerance is an individual's resistance to stressor, and it differs from a person to another. Tolerance can be affected by cognitive assessment, experience, demand, interpersonal effect, and stressful situation. There are people who are sensitive to certain stress due to past experiences that they cannot handle well. Thus, everyone has a diverse adjustment to stress as their assessment of stress is diverse too. Intermittent stress is stress whose exposure sometimes with a recovery period will lead to further stress tolerance.

#### 3. Mind Calming Technique

This technique is performed by reducing thinking activity, the process of thinking in the form of planning, remembering, imagining, and reasoning, which is continuously carried out in an awake and conscious state. Ways that can be done include meditation, relaxation, smiling, humor and laughter, variation in personal appearance, and interacting with other people.

#### 4. Calming Technique through Physical Activity

The technique is performed by using up the stress result produced by fear and threat through physical activity, including doing hobby every day, exercising regularly, eating healthy food, avoiding consumption of alcohol, cigarette, and drugs, getting enough sleep, worshipping, and praying.

#### 4. Closing

In reference to the earlier elaboration, stress is confirmed to be one of stroke risk factor. We are reminded to reduce the incidence of stroke in society by relieving stress level of each individual. A person's stress level can be relieved through integrated stress management starting from the planning, organizing, actuating, and controlling stages. In addition, various aspects of human life, starting from diet, sleep pattern, activity pattern, to mindset, must be controlled properly. Your life must be on the right track, or it will end up with stroke.

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**CURRICULUM VITAE****Personal detail**

Nama : Dr.dr. Muhammad Isman Jusuf, Sp.S  
 NIP : 19780703 200604 1 003  
 Date of birth : Ujungpandang, July 3<sup>rd</sup> 1978  
 Religion : Islam  
 Marital Status : Married  
 Office adress : Medical Faculty UNG  
 Jl.Jenderal Sudirman Kota Gorontalo  
 Residence : Jl.M.H.Thamrin No.67 Kel.Ipilo Kota Gorontalo  
 Phone/email : 081328779109/ ismanjusufi@gmail.com

**Education Details**

- Graduated from SD Negeri 4 kota Gorontalo (1990)
- Graduated from SMP Negeri 3 Manado (1993)
- Graduated from SMA Negeri 3 Manado (1996)
- Medical Doctor in faculty of medicine Gadjah Mada University (2003)
- Neurologist in faculty of Medicine Gadjah Mada University (2008)
- Doctor of health sciences in Airlangga University (2016)

**Occupational Details**

- Neurologist in Aloei Saboe hospital and Gorontalo Islamic Hospital (2008-now)
- Lecturer in Faculty of Sport and Health Sciences Gorontalo State University (2008-Now)
- Lecturer in Faculty of Medicine Gorontalo Sate Uniersity (2019-Now)

**Position in occupational details**

- Secretary of Nursing Department in Faculty of Sport dan Health Sciences Gorontalo State University (2008-2011)
- Vice Dean in Faculty of Health Sciences Muhammadiyah University of Gorontalo (2009-2012)
- Dean in Faculty of Health Sciences Muhammadiyah University of Gorontalo (2012-2016)
- Rector in Muhammadiyah University of Gorontalo (2016-2020)

**Organization**

- Member of Indonesian Neurologist Association in Manado (2008-Now)
- Chairman of Indonesian Medical Society of Herbal Medicine in Gorontalo province (2014-Now)
- Chairman of Indonesian Medical Doctor Associaton in Gorontalo city (2017-Now)
- Chairman of Indonesian Medical Society of Emergency in Gorontalo province (2018-Now)