



Latest Trends for Type 2 Diabetes (T2D) from Bio-Psycho-Social Points of View

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Abstract

Authors et al. have continued clinical practice and research for Type 2 diabetes (T2D) and related regions. T2D patients tend to have psychosomatic problems such as depression and anxiety, where cognitive behavioral therapy (CBT) has been effective. Recent topic includes gut-brain-microbiota axis (MGBA) intervention for controlling glucose variability, circadian rhythm and hormonal aging changes. We evaluated T2D from Social Determinants of Health (SDOH) points of view. It has various factors, including industrialization and globalization of the culture as structural SDOH, family environments, knowledge, education as interpersonal aspect, and lower aerobic capacity, muscle power, and physical activity as individual aspect.

Keywords: Cognitive Behavioral Therapy (CBT); Gut-brain-microbiota axis (MGBA); Social Determinants of Health (SDOH); Montreal Cognitive Assessment (MOCA); Hinoharaism

Commentary Article

Authors and clinical team have continued medical practice and research for Type 2 diabetes (T2D) for long. T2D has shown deep relationship with other diseases, such as non-communicable diseases (NCDs), atherosclerotic cardiovascular diseases (ASCVDs), Metabolic syndrome (Met-S) and others. Some related topics would be described in this article.

T2D patients tend to have psychosomatic problems such as depression and anxiety. Then, cognitive behavioral therapy (CBT) has been known to give them adequate treatment. Recent report showed efficacy of CBT for T2D group [1]. The compared items included physical activity program, improved QOL, larger adherence to therapeutic method, discomfort, anxiety and depression. From meta-analyses of RCT for T2D, CBT can give improvement of glycemic control. Further, some methods on medication of anti-depressants and psycho-therapy showed effectiveness for intervening depression for T2D [2].

T2D has been involved in irregularity of sleep and awake circadian rhythm [3]. It includes hypersomnia and insomnia, which means 9< hours, and 7> hours per day, respectively. They are influenced by various factors, such as anxiety, changed

appetite, depression, decreased satiety, immune dysfunction, insulin resistance and blood pressure. This circadian rhythm has close relationship with gut-brain-microbiota axis (MGBA) intervention [4]. Disorders of MGBA may cause the exacerbation of obesity and diabetic complications. They have several related inducers including bacteria, viruses, fungi infection, endothelial dysfunction, oxidative stress and metabolic disorders [2,5]. Furthermore, some influences of life span factors exist such as menopause with reduced estrogen, andropause, gestation, post-partum depressive state, and adolescence related with hormonal aging changes [6]. Recently, the intervention measures of MGBA for diabetes have attracted attention. They include nutritional approach, short-chain fatty acid [7], psychosomatic aspects of all ages [8,9], cardiovascular axis [10,11], and novel MGBA interaction [5]. In addition, other factors are found as rest, exercise, convenient use of technology, health care education, avoiding toxin exposure, appetite regulating agents, and family stability by psychological approach.

For T2D patients, impaired balance of MGBA and intestinal flora would show some relationships with several pathophysiology, including vascular dementia, Parkinson disease and lost gray matter of axonal and frontotemporal regions [12,13]. All of these

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pathologies may bring MGBA damage, stressful change and chronic inflammatory situation. They influence negative effect for endocrine adipocyte that is related with production of angiotensin precursors and pro-inflammatory cytokines [14]. Its condition would be perpetuated by eating impaired problems when actual meal would have higher amount of simple carbohydrate, lipid and less protein micronutrient or complex carbohydrate [5]. MGBA may have adequate balance for psychosomatic, nutritional and environmental harmony. The reason would be that the microbiota has various functions in the followings [13]. They are activation of immune system, proper intestinal regulation, central adequate regulation for metabolism and appetite. Human appetite has been controlled by neuropeptide Y, leptin, γ -amino butyric acid (GABA), and brain-derived neurotrophic factor (BDNF), glucose and lipid metabolism due to liver function. These functions have some pathways in enteric and autonomic nervous system, hypothalamic-pituitary-adrenal (HPA) axis, the vagus nerve, astrocyte influence from immune system, microbial metabolites and enteroendocrine function [15]. Thus, microbiota may contribute general metabolic function associated with pathophysiological situations [16].

T2D patient tends to develop dementia or mild cognitive impairment (MCI) with higher prevalence. For diagnosing them, Mini Mental State Examination (MMSE) or Montreal Cognitive Assessment (MOCA) have been often used. MOCA has 30 questions and categories similar to MMSE, in which executive visuospatial orientation, memory, language, attention, abstraction, orientation and delayed memory. As its score, cut-off point is 26 points with maximum 30, where 1 point addition with schooling more than 12 years [17]. From recent report, frail elderly with MCI received exercise program using MOCA scale, and showed improvement for motor, cognitive and vitality domains, suggesting effective method for the subjects [18].

Diabetes should be evaluated from Social Determinants of Health (SDOH) point of view [2]. As to structural SDOH, crucial points include industrialization and globalization of the culture, increased intake of simple carbohydrates, lower national and regional economic income, public health policy, environmental situation, unemployment, poverty, natural disasters, climate crisis and human emergency [2].

Another SDOH would be interpersonal aspect. They include lower situation of family environments, knowledge and education of nutrition and health care for maintaining adequate life style [2,19,20]. Concerning these states, certain relationship was found between emotional psychological trauma in childhood and psychiatric bipolar affective disorder as odd ratio (OR) of 4.04 [5]. In addition, other factors may be found, such as depression, eating disorders, anxiety, stressful family condition, violence, various abuse, alcohol, and so on [21].

Individual SDOHs also have some genetic influences, which contribute the related patient to moderate degree. From a recent study [22], a person associated with 1st-degree relatives of T2D shows 5-6 times higher of individual SDOH problems. They include certain elements related to T2D and psychiatric disorders, such as schizophrenia, bipolar affective disorder, depressive history, attempted suicide, and personality disorder [8]. Other factors may contribute to the risk for T2D, such as lower physical inactivity, and lower energy expenditure, aerobic capacity, muscle power, and others. From recent Sweden report, lower muscle power and aerobic capacity showed close relationship with T2D onset and development in adulthood, indicating that sedentary lifestyle may elevate T2D risk regardless of BMI value [10,23].

When medical staffs are on the management for T2D patient, we plan to check three steps. They are i) to consider social determinants of risk factors for mental health care, ii) to try evaluating and screening some tools for intervention strategies, and iii) to provide adequate diagnosis for psychological pathology with applicable advice and/or treatment. These strategies are based on the concept of primary care and Hinohara-ism that was established by supreme Japanese physician, Dr. Shigeaki Hinohara who was equivalent to Dr. Albert Schweitzer and Sir William Osler [24](Bando).

In summary, latest topics for T2D with MGBA, MOCA, SDOH, Hinohara-ism were introduced. T2D has been crucial disease to be treated with the adequate management from bio-psycho-social points of view. This report becomes hopefully a beneficial reference for diabetic research.

Conflict of Interest

The authors declare no conflict of interest.

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