

Improve Life Quality of Type 2 Diabetes Patients by Lifestyle Intervene in China: A System Dynamic Approach

Xia Lu, Jiangzhou Chu

Urban vocational College of Sichuan, Chengdu, 610101, China

Abstract: The prevalence of diabetes is alarming worldwide, especially in China. Along with long-term hyperglycemia for type 2 diabetes patients, their body develop lots of micro and macro-vascular diseases--- complications, including cardio-vascular diseases, kidney diseases, eye diseases and so on and so forth. The diabetes complications are some leading causes of mortality and morbidity, which sever affect and reduce life quality of type 2 diabetes patients in China. The purpose of this project to utilize a System Dynamic (SD) approach improve life quality of type 2 diabetes patients in China through lifestyle intervention, including physical activities and healthy dietary intake. **Methods:** The scope of this project was based on information obtained through scientific literature review and interviews with 2 doctors in China. Then, a causal loop diagram was created to shed light on this problem in China. **Results:** Results from this project show that lifestyle intervention including physical activity and healthy diet is an effective way to reduce or intervene complications for type 2 diabetes patients in China. **Conclusion:** Lifestyle intervention is an effective way to improve life quality for type 2 diabetes patients.

Keywords: Improve life quality; Type 2 diabetes patients; Lifestyle intervene; China system dynamic approach

1. Introduction

The prevalence of diabetes is increasing at an alarming rate worldwide [1]. Especially for the past 30 years in China, in 1980, the prevalence of diabetes was 0.67% in 1980, it increased to 11.6% in adults in 2010, which is accounting for 114 million adults with diabetes [2]. 90 percent of diabetes are type 2.

Diabetes is a problem with the body that causes higher blood glucose level than normal. With long-term hyperglycemia for these patients, their body generates micro- and macro-vascular diseases, including Cardio-vascular diseases, Diabetic kidney disease, and so on and so forth, which are called complications [9]. These complicated complications give rise to highly mortality and morbidity [6]. And these complications adversely and seriously impact the life quality of type 2 diabetes patients [7].

In China, inadequate control of hyperglycaemia is a very common challenge for long-term diabetes management, and caused lot of complex complications. For type 2 diabetes [8].

2. Problem Statement

Based on the high prevalence type 2 diabetes, and severe health effects of hyperglycemia complications, public health has been great interested in the issue and has the responsibility to improve the quality of life for type 2

diabetes patients. When complicated diabetes complications severely decreased the quality of life for patients with type 2 diabetes, how to intervene or delay these complications to improve patients' life becomes the most important and effective way.

Abundant previous studies investigated high risk factors of diabetes, and association between intervene one or some risk factors of diabetes and relive or delay hyperglycemia complications. To be more details, Previous study stated that lifestyle interventions are recommended ways to take care of type 2 diabetes patients [5]. Lifestyle intervention, such as physical activity, an effective way to lose weight, is able to reduce cardio-vascular diseases risk [3]. To be more details, physical activities reduces glycated hemoglobin to reduce blood glucose levels for diabetes patients. In addition, healthy diet intake, for instance, whole wheat intake is another way to reduce type 2 diabetes risk [4].

In addition, System Dynamic is useful because it is able to model and understand the dynamic exiting problem within the system [10]. Therefore, the aim of the paper is to utilize a System Dynamics approach to address the low quality of life of type 2 diabetes patients in China, which is the highest prevalence of diabetes, through lifestyle weight lose including physical activities and health diet intake.

3. Methods

To my present knowledge, no other studies utilize System Dynamic model to describe the problem of low quality life of type 2 diabetes patients in China.

In order to obtain enough useful information for this project, I did scientific literature reviews and interviewed with many doctors working in hospitals in Shanxi and Sichuan provinces in China. With in previous studies and consulting doctors, lots of information and ideas about the high risks factors of diabetes, progression of aggravates complications, life quality reduced seriously by complications and effective interventions for complica-

tions are gathered. Based on these information, I selected appropriate variables, and used system thinking to evaluate the life quality of type 2 diabetes patients. As a result, a causal loop diagram was created to model this problem in the project.

4. Results

The project focused on how to reduce or intervene diabetes complex complications to improve life quality for type 2 patients in China by lifestyle interventions including physical activities and healthy diet intake.

The table below provides the endogenous and exogenous variables involved in the project.

Table 1. Variables selected for the project

Endogenous Variables	Exogenous Variables
Lifestyle interventions	Social environments
Life quality of diabetes patients	Medicine Cure
Consciousness of diabetes intervention	
Diabetes complications	
Physical activities	

Regarding time horizon, I consider 30 years in the past lie the roots of the problem, since within 30 years, the prevalence of diabetes increased from 0.67% to 11.6% among adults in China, which is more than 10 time increased. Along with diabetes process, the complications are aggravating, then the historical behavior of the life quality for these patients is downward goal seeking.

A causal loop diagram is created to shed lights on the problem and figure out lifestyle intervention is an effective way to address this problem.

Figure1 is the Model for improving life quality for type 2 diabetes patients in China. Along with the consciousness of diabetes intervention, patients realized the importance of intervention. Then, physical activities and healthy diet intake would be the lifestyle interventions to reduce or intervene the serious and complicated complications, ending up improving life quality for these type 2 diabetes patients.

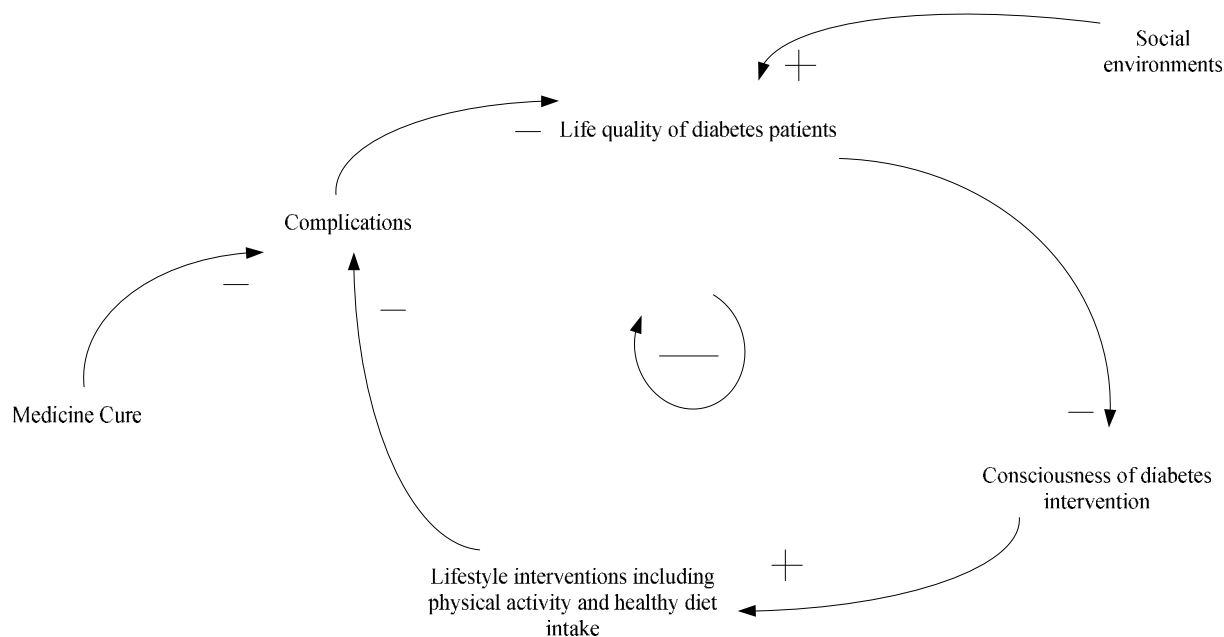


Figure 1. Balanced causal loop diagram for the project

5. Conclusion

Based on the results in this project, health-related quality of life is closely associated with Type II diabetes complications, and these complex diabetes complications obviously decrease the life quality of diabetes patients in China, this project implicates for policy-makers that reducing or preventing the complications of diabetes by lifestyle intervene, including physical activity and health diet intake is the key to improving patient quality of life.

References

- [1] Begum A., Muttalib M.A., Arefin M.N., Hoque M.R., Sheme Z. A., Akter N., Paul U.K. Challenges in HbA1C level as a diagnostic tool of diabetes and pre-diabetes in middle-aged population: The bangladesh study. *Mymensingh Medical Journal: MMJ*. 2016, 25(4), 721-725.
- [2] Weng J., Ji L., Jia W., Lu J., Zhou Z., Zou D. On behalf of Chinese Diabetes Society. Standards of care for type 2 diabetes in China. *Diabetes/Metabolism Research and Reviews*. 2016, 32(5), 442-458.
- [3] Adu-Sarkodie N.Y. Clinical management of diabetes mellitus in the older adult patient. *Current Diabetes Reviews*. 2016.
- [4] Afkarian M., Zelnick L.R., Hall Y.N., Heagerty P.J., Tuttle K., Weiss N.S., De-Boer I.H. Clinical manifestations of kidney disease among US adults with diabetes. 2016, 316(6), 602-610.
- [5] Koopmanschap M. Coping with type II diabetes: The patient's perspective. *Diabetologia*, 45(Suppl 1), S22. 2002.
- [6] Dong Y., Gao W., Zhang L., Wei J., Hammar N., Cabrera C.S., Qiao Q. Patient characteristics related to metabolic disorders and chronic complications in type 2 diabetes mellitus patients hospitalized at the qingdao endocrine and diabetes hospital from 2006 to 2012 in china. *Diabetes & Vascular Disease Research*. 2017, 14(1), 24-32.
- [7] Shi J., Wang Y., Cheng W., Shao H., Shi L. Direct health care costs associated with obesity in chinese population in 2011. *Journal of Diabetes and its Complications*. 2016.
- [8] Katula J.A., Kirk J.K., Pedley C.F., Savoca M.R., Effoe V.S., Bell R.A., Bertoni A.G. The lifestyle intervention for the treatment of diabetes study (LIFT diabetes): Design and baseline characteristics for a randomized translational trial to improve control of cardiovascular disease risk factors. *Contemporary Clinical Trials*. 2016.
- [9] Qin J.B., Yang T.B., Li F.R., Wang H. Whole-grain intake and risk of type 2 diabetes. *The American Journal of Clinical Nutrition*. 2016, 104(6), 1722-1723.
- [10] Sterman J. *Business dynamics system thinking and modeling for a complex world* (Third Edition ed.). New Delhi: McGraw. 2000.