Original Research Article

A review of changes caused by COVID-19 pandemic in the lifestyle of People with Diabetes (PWD) in India

Subhash Kumar[1*], Abhijeet Gupta[2], Anjali Vijaya[3]

[1]Diabetologist, Diabetes and Obesity Care Centre, Patna, Bihar, India
[2]Diabetologist, Hiranandani Hospital, Mumbai, Maharashtra, India
[3]M.B.B.S. 1st year Jaipur National University of Medical Science, Jaipur, Rajasthan, India

Received: 25-11-2021 / Revised: 08-12-2021 / Accepted: 09-01-2022

Abstract

Background: COVID-19 pandemic has set a new normal to the life of people in the world. It has severely affected the lives of people living with diabetes across the world. India has the second-largest population living with diabetes and the pandemic has posed several challenges in their daily living. It has not only affected the physical and social health but also has a negative impact on the psychological health of PWD in India. **Aims**: This review aims to find out the effect of the pandemic and the measures to improve the health of PWD in different regions of India. **Methods:** A web-based search was conducted on the topic of diabetes and Covid-19 pandemic and life-style modification in India. Boolean research was done to find out the literature on PubMed and Google Scholar. We found 157 articles of which we selected 56 articles with full text retrieved. **Results:** A weight gain of 5-10% in 19% of the person(s) with diabetes (PWD) indicates that there were negative impacts on glycaemic control and overall health condition of a group of persons with diabetes. 44.8% of PWD population of Bihar changed their eating habit and 19.7% noticed an increase in weight which looks little less than the other parts of the country. **Conclusion:** In conclusion, uncontrolled diabetes is one of the major causes of high mortality in COVID-19 infection. There is an urgent need for a structured diabetes education plan for different areas of India.

Key-words: PWD- Person With Diabetes; BMI- Body Mass Index; SMBG- Self Monitoring of Blood Glucose

Introduction

The study is aimed to understand the effect of the COVID-19 pandemic in the daily routine of the people living with diabetes (PWD) in India. The novel coronavirus disease (COVID-19) has challenged the existence of human life on earth as it has taken the shape of a pandemic since its first detection at Wuhan Jinyintan Hospital in China as a zoonotic disease probably originated from the bat as the genome of COVID-19 virus has 96% similarity with the bat SARS-like coronavirus strain BatCov RaTG13 (WHO 2020) in November 2019. Since then, it is rapidly taking the shape of a pandemic before the international health care authorities could have reacted (Rabi et.al 2020) and the WHO declared the 2019 Corona Virus Disease (COVID-19) outbreak as an international public health emergency on 30th January 2020 since its first case reported at Wuhan in China. Diabetes Mellitus has been studied and labelled as one of the significant risk factors for a more severe form of COVID-19 disease and has higher mortality in an early nationwide study of 1590 laboratory-confirmed hospitalized patients from 575 hospitals in 31 provinces of mainland China (Guan et al. 2020). India is a vast country with different cultures in different regions. Due to this diversity of cultures and practices the effects of a pandemic can have a different impact on people. Hence this review aims at analyzing the difference in the lifestyle of PWD in different parts of India. The area of the review will range from the effect of the pandemic on the change in lifestyle of PWD, the effect on glycemic control, the psychological impact of the pandemic, and recommendations for the public and government.

Literature Review

In the current pandemic situation, there is much good quality research paper published on COVID-19 on various aspects including its effect on the lifestyle of people living with Diabetes since the pandemic hit the world. The pandemic has set a new normal to the life of the general population for the whole world. The people living with diabetes have two-fold increased severity of COVID-19 infection and it a new threat to look after (Kumar et al. 2020). Poor glycemic control in diabetes is associated with poor immunity status reflected by decreased complement factor 4 and low cytokine response. Such low immune status has loss of protective effect of chemotaxis, phagocytosis, and killing by granulocyte and agranulocyte cells which makes a favorable environment for microbial growth and severs damage to infected organs (Guan et al. 2020). So, people suffering from diabetes are a high-risk population along with other co-morbid conditions like hypertension, chronic kidney disease, COPD, obesity, chemotherapy, etc.

A study of urban area survey in the northern part of India on T2DM revealed that there was about 42% reduction in exercise duration in the study population, however, 62% of them were doing some form of exercise which included aerobic exercise in 44%, yoga 17% and resistance exercise in 3% as there was plenty of time available for indoor activity. Despite that, there was a weight gain of 5-10% in 19% of the person living with diabetes (PWD) which indicates that there were negative impacts on glycemic control and overall health condition of a group of persons with diabetes (Ghosh et al. 2020). However, this is an urban area picture of physical activity which may vary in different socio-economic and geographical locations. In a south India survey 80% population reported to be doing exercise and diet control during lockdown however they reported that they could not go outside and kept themselves active in their house. (Nachimuthu et al. 2020).

According to a study by United Nations, there is a 58% increase in overeating in lockdown situation out of which intake of fried and fatty food increased by 62% and it was causally related to stress due to pandemic (Food and Agriculture Organization 2020), 56% of the participants reported having an increase in the quantity of main meal,

*Correspondence
Dr. Subhash Kumar
Diabetologist, Diabetes and Obesity Care Centre, Patna, Bihar, India

about 27% reported changes in the preferred foods for main meals and the rest reported changes in the timings of consuming main meals. About 42% of the participants eat food that required minimum cooking and preserved food, 28% reported that they preferred ready-to-eat foods and others reported that they preferred legumes/ vegetables/ animal-based foods for their main meals. 84% of the study population had changed dietary habits, which was in line with the results of a study conducted by Lippi et al. (2020) which concluded that unhealthy dietary habits in pandemic situations may be the vital reason for weight gain. These improper dietary habits mainly included a decrease in the fruits/vegetable intakes, increased snacking, increased tea/ coffee consumptions lockdown, and increased intakes of ready-to-eat or processed foods in the present study. The poor dietary habit and stress is a reason to worry in a pandemic situation for PWD and poor glycemic control.

A study of the northern part of India reported fewer testing of blood glucose and self- monitoring of blood glucose which was reduced in 23% of PWD as compared to before lockdown status (Ghosh et al. 2020). Poor monitoring of blood glucose is always associated with dysglycemia and hypoglycemia particularly with comorbid conditions, T1DM, and extremes of age. Similar findings were reported from southern parts of India where they found only 28% of PWD did regular testing of blood sugar level. The dismaying part of the study was that 14% of people never tested their blood sugar level during the period whereas 43% did occasional testing (Nachimuthu et al. 2020). This was probably due to the unavailability of glucometer/ strips or lack of education about SMBG. Normally in India, blood glucose testing is done on every visit to the clinic and SMBG is not a regular habit for PWD. A two-year follow-up study of real-world evidence of glycemic control of T2DM in India documented only 23.4% having Hba1c <7% (Borgharkar and Das 2019). India is probably the second highest populous country with diabetes (>70 million) in the world with an average prevalence rate of 7.3% in the ICMR- INDIAB study (Anjana et al. 2011). It is a huge burden on the health care system and the COVID-19 pandemic makes these populations vulnerable to poor outcomes if they contact SARS-CO-19 infection. As hypoglycemia is a common occurrence in T1DM lack of SMBG or absence of regular follow-up during pandemic condition makes them prone to severe complications (Verma et al. 2020). It is high time that education on SMBG should be taken at each level of the health care system for PWD in India especially when people are more health concern and ready to accept health advice due to fear of COVID-19 pandemic.

An early predictive study based on simulating model using multivariate regression analysis of the impact of pandemic lockdown on glycemic level revealed an increment of 2.26% on 30 days lockdown and 3.68% on baseline HbA1c in 45 days lockdown (Ghosal et al. 2020b). The average HbA1c in India according to DiaCare Study is 8.9% (Mohan et al. 2014) and the expected Hba1c at the end of lockdown by the above predictive study is 16.84%. Such an incremental increase in Hba1c is also going to affect diabetes-related complications and we need a pre-planned strategy to put in place if there is a second wave lockdown situation in the future. In Bihar, 26% of the PWD population reported an increase in blood sugar level, 22% reported a decrease in blood sugar and the rest (52%) reported no change. (Kumar et al. 2020).

Methodology

A web-based search was organized on the Covid-19 pandemic, diabetes and life-style modification in India. Boolean research was done to find out the literature on PubMed and Google Scholar. We found 157 articles of which we selected 56 articles with full text retrieved. We excluded the article which included the influence of drug therapy and diabetes as it was out of the scope of our literature review. We excluded the articles which were not intended to reflect the lifestyle of PWD in this situation. We systematically reviewed this influence on PWD on their diet, glycemic control, physical activity level, blood glucose self-monitoring. We also looked at the psychological wellbeing of people with diabetes during the pandemic and selected the papers on psychological impact arising out of lockdown and pandemic related stress and news/media-related impact on the population. The findings have been contrasted with previous findings made by us in our previously published paper "Effect of COVID-19 Pandemic in the Daily Lives of People with Diabetes in East India" (Kumar et al 2020).

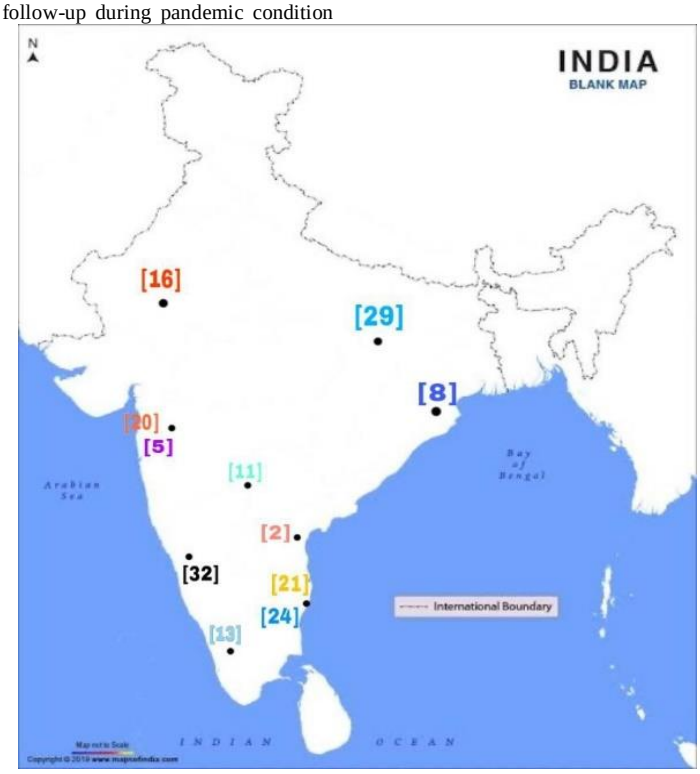

Fig. 1 Study representations across India

Discussion and analysis

Studies have indicated that PWDs have higher mortality and morbidity rate in the ongoing coronavirus pandemic (Kumar et al. 2020). Good glycemic control in PWD makes a big difference in outcome as there is an 87% reduction in mortality in a diabetic person compared to poor glycemic control (Zhu et al. 2020). Poor glycemic control is connected to poor immunity status (Guan et al. 2020) which is a favourable environment for microbial growth and severe damage to infected organs. So, people suffering from uncontrolled diabetes are a high-risk population along with other co-morbid conditions like hypertension, chronic kidney diseases, COPD, obesity, chemotherapy, etc.

Effects on physical activity

Lockdown condition during a pandemic had significantly impacted the physical activity level as outside movements were completely restricted and the reduced level of physical activity was found to have negatively influenced the glycemic control of a person having diabetes (Ghosal et al. 2020).

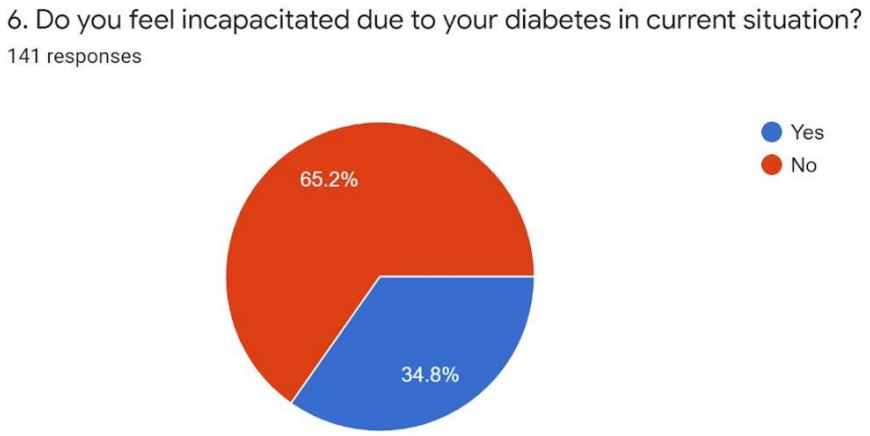

Fig. 2 Diabetes pattern during pandemic (Kumar et al 2020)

The common factor in all the study populations where improvement on glycemic control was noted was the educated urban population who had a regular visit to diabetes clinic. The study specifically on the rural population living with diabetes is lacking and there is a need for extensive research on the rural population required where one-third of the country population lives. However, the study which was conducted in the urban-rural population of Bihar indicated that 69.9% of PWD population started performing some kind of exercise such as yoga, exercise etc which was in line with the study of North India (Kumar et al. 2020)

Fig. 3 Physical motion during pandemic (Kumar et al 2020)

Dietary Pattern

Another factor that has crucial effects on the healths of COVID-19 patients is the dietary pattern of PWD. Initially during lockdown people were much cautious and overall intake was restricted due to the disturbance in the food supply chain however 7% of PWD started taking fruits in their diet and there was a 20% increase in fruit consumption overall. On the other hand, prolong home stay increase the frequency of snacking by 23% but one healthy change in the dietary pattern due to lockdown was outside food was completely avoided so all the food consumed was homemade. But the carbohydrate intake was reported to increase by 21% and 13% increase consumption in fat intake (Ghosh et al 2020). Lockdown imposed stress as studied by different authors, leads to either under/overeating habit in individuals and binge- eating as stress buster is not an uncommon habit (Mehta et al 2020). According to a study by United Nations, there is a 58% increase in overeating in lockdown situation out of which intake of fried and fatty food increased by 62% and it was directly related to stress due to pandemic (Food and Agriculture Organization. 2020).

An increase in carbohydrate consumption during a pandemic situation can also be related to boredom, non-availability of fresh vegetables, healthy food choices, and stress during the pandemic. For a balanced

diet approximately only 50 to 60% of the total calorie intake should come from carbohydrates which should preferably be complex carbohydrates and can also supplement about 25 to 40 g/day of total dietary fibre. Fruit juice, aerated beverages, and sugar-containing drink must be avoided. Fat intake should not contribute more than 30% of total calories/day and trans-fat should be avoided along with saturated fat (Banerjee et al. 2020). The effect of carbohydrate carving on low mood is proportional to the glycemic index of foods resulting in a higher risk of obesity (Basal Metabolic Index, BMI ≥ 40 kg/m2), poor glycemic control, and cardiovascular disease (Muscogiuri et al. 2020). Contrary to other parts of India, 44.8% of PWD population of Bihar changed their eating habit and 19.7% noticed an increase in weight which looks little less than the other parts of the country.

Fig. 4 Eating habits during pandemic (Kumar et al 2020)

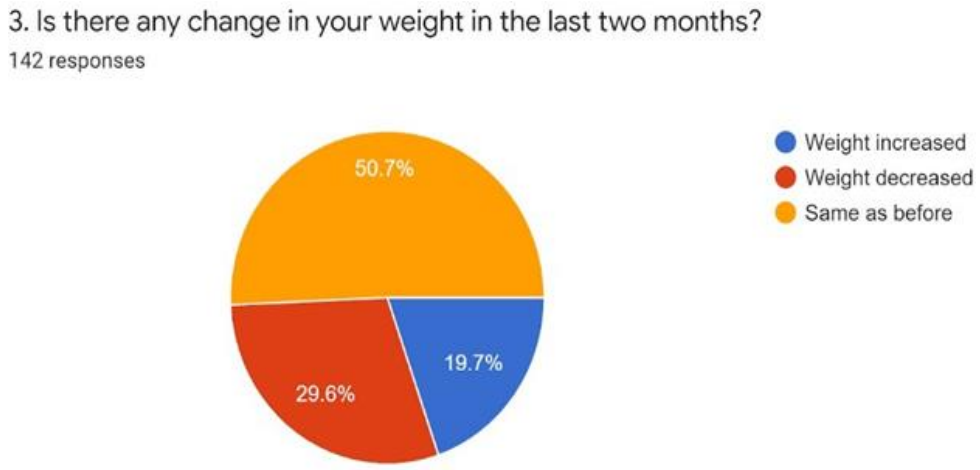

Fig. 5 Weight calculation during pandemic (Kumar et al 2020)

So, dietary advice which is an integral part of diabetes self-management education program and in a lockdown situation education about nutritional intake is vital however there is no uniform validated structured diabetes education program available especially suited for different regions of the Indian state. The pandemic situation creates an opportunity to make a positive change in habit and lifestyle as people are more receptive to health care advice and health education programs can be successful if taken during such situations.

Blood Glucose and Self-monitoring of Blood Glucose

Pandemic also had an impact on Blood Glucose and Self-monitoring of Blood Glucose and there was a reduction of 23% in SMBG as compared to before lockdown status (Ghosh et al. 2020). The dismaying part of the study was that 14% of people never tested their blood sugar level during the period whereas 43% did occasional testing (Nachimuthu et al. 2020). This was probably due to the unavailability of glucometer/ strips or lack of education about SMBG. India is probably the second highest populous country with diabetes (>70 million) in the world with an average prevalence rate of 7.3% in ICMR- INDIAB study (Anjana et al. 2011) which makes more than 54 million PWD having poor glycemic control. It is a huge burden on the health care system and the COVID-19 pandemic makes these populations vulnerable to poor outcomes if they contact SARS-CO-19 infection. The poor glycemic control is either due to late diagnosis or, and failure to early optimum pharmacotherapy with inadequate lifestyle modification. The lack of SMBG is also one of the contributing factors in poor glycemic control in India and has further deteriorated in the lockdown period and a severe matter of concern in T1DM. As hypoglycemia is a common occurrence in T1DM lack of SMBG or absence of regular follow-up during pandemic condition makes them prone to severe complications (Verma et al. 2020). The average HbA1c in India according to DiaCare Study is 8.9% (Mohan et al. 2014) and the expected Hba1c at the end of lockdown by the above predictive study is 16.84% (Ghosal et al. 2020b). There was no data on SMBG practice in Bihar. It is high time that education on SMBG should be taken at each level of the health care system for PWD especially when people are more health concern and ready to accept health advice in fear of the COVID-19 pandemic.

Conclusions and Recommendations

Based on the available literature it is clear that the pandemic has severely impacted the lives of people living with diabetes. Studies are suggesting uncontrolled diabetes as one of the major causes of high mortality in COVID-19 infection. Lockdown situations need special support in terms of providing medical supplies and medical consultations for a high-risk population like diabetes, hypertension, COPD, obesity, malignancy, etc. There is an urgent need for a structured diabetes education plan for different areas of India in regional languages. Lockdown has been associated with poor glycemic control associated with poor self-monitoring of blood glucose. There are studies confirming weight gain due to less physical activity and high-calorie intake. The pandemic situation has severe psychological impact associated with depression, anxiety, distress, and panic due to uncertainty about the disease and poor medical facility. Media overdose of pandemic related negative news and negativity in social media circulation is one of the major causes of psychological illness in this situation. Teleconsultation is one of the safest and easiest ways to provide medical consultation in a pandemic situation. There should be routine teleconsultation to all the high-risk population including people living with diabetes. Self-monitoring of blood glucose and blood pressure should be encouraged so that optimum control can be maintained even with changed lifestyle and increased stress due to pandemic.

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Conflict of Interest: Nil Source of support: Nil