

COVID-19 and Diabetes Mellitus

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ABSTRACT

BACKGROUND

COVID-19 is proving deadly for the people with underlying health conditions. It is important to make strategy according to the current scenario and leave some space for changes that are happening dynamically.

SUMMARY

COVID-19 and comorbidity are meant to prove lethal and accounts for maximum number of deaths in case fatalities induced due to COVID-19 complications. Diabetes tops the table with a quarter of fatalities are induced by it when in COVID-19 infection. Various post COVID-19 health implications are also increasing the need of awareness about preventive measures that must be followed by all the people and not by particular section.

CONCLUSION

More study needs to be done although present studies has already clarified about the deadly combination of COVID-19 and diabetes. Also nuanced aspects such as age wise and type wise segregation of data would serve the purpose of drawing more feasible containment model.

KEYWORDS: COVID-19, DIABETES, TYPE-1, TYPE-2, PROPHYLACTICS, COMORBIDITY.

INTRODUCTION

COVID-19 or coronavirus disease 2019 is the deadliest pandemic witnessed in last century. The rapid spreading ability and its deadly nature is as serious challenge in containing the virus. The Wuhan city of the Hubei province of china had seen the emergence of the disease. From Wuhan to every corner of the world, it has been and still is disturbing the lives of people whether directly or indirectly. Till December 20, 2020, 76,368,369 infected cases with COVID-19 has been registered and case fatalities stands at 1,687,197 which surpassed the one million mark which marks it the lethal pandemic of the century(1). Although recovery rate is as high as above 95 percent but case fatality rate which stands at about 3 percent when converted to fatalities, results in huge numbers(2). Most of the fatalities are

observed in persons having any chronic underlying medical condition. Comorbidity has established itself as the facilitator of the worse outcomes. Comorbidities such as diabetes, hypertension, cancer, renal ailments and so many are considered to prove bad if COVID-19 infection combines with them(3). The death toll has crossed one million mark underlying its severity. Diabetes mellitus is considered as the worst comorbidity and has proven to be worsening the condition of the COVID-19 patients. Diabetes already proved to be inviting agents of various other medical conditions such as secondary infections, weakening immunity, affecting the day-to-day functioning of the body. Obesity is another chronic condition which is generally has mutual relation with diabetes. Not only during COVID-19

infection the condition is bad, post illness disorders may arise as it was seen in SARS(4) and MERS outbreaks(4). According to World Health Organization (WHO) 422 million people are currently infected with diabetes mellitus. Also, it is included in the list of disease from which most non communicable disease induced deaths occur. Such is the deadly nature of the diabetes and when combine with COVID-19 produces only worst results. Preventive measures need to be adopted so that at least they maintain the pre-pandemic level of fitness. The access to healthcare is hindered by various lockdown measures and fear of contracting the disease. Various technologies can be used to stay in touch of the doctor for any medical consultations. This article takes comprehensive overview of comorbidity, particularly diabetes and various preventive measures in ongoing COVID-19 pandemic(5).

COVID-19 AND COMORBIDITY

The ever-increasing menace of COVID-19 which was started almost a year earlier is continuing till date. One and half million registered casualties had taken place till date and the number is ever increasing. Various studies till date has found that there is an intimate relationship between case fatalities and various preexisting illnesses that the deceased person were suffering which is also known as comorbid condition(6). In some cases, it was multiple morbidities as various underlying medical conditions were found to be associated with the deceased. If a person is comorbid then the chances are high that he or she will develop severe symptoms and be needing intensive care medical attention. Oxygen support system and ventilator are prime critical support infrastructure. Further late diagnosis of the COVID-19 also affects multiple organs and lack of oxygen may hinders the proper functioning of the concerned organ. Comorbidities may include cancer,

diabetes, hypertension, renal ailments etc. which are acquired by the people over few decades due to sedentary lifestyle and imbalanced diet. High sugar, high carbohydrate food, junk food, food containing monosodium glutamate (MSG) are some of the contents in the daily diet of the people which are worsening the inner body metabolism. Not having proper gut bacteria and gut microbiome can have major impact as the gut-respiratory system axis plays an important role in generating innate immune response to external invasion of pathogen like coronavirus. Comorbidity basically weakens your immunity power over the time and pandemic of COVID-19 put the last nail on the coffin by attacking in the vulnerable state of the people. Even those who survived were found to be complaining persistence of symptoms including loss of taste and smell, fatigue and many more which needs constant follow up after discharge up to several months. As evidenced from previous outbreaks of SARS and MERS drastic change in lifestyle and reduced physical capacity are some of the unwanted outcomes of the respiratory syndrome and coronavirus belongs to that family only. Therefore, case fatalities in COVID-19 are generally more in age group of above 50 years which indicates their decreasing immunity power in sedentary lifestyle. Although lower aged population with comorbidities are also fatally affected but the figures are low comparably. Multiple organ systems are affected in COVID-19 and not just respiratory tract. Most profound and visible impact was found to be on cardiovascular system where cases ranges from myocardial muscle getting weakened and myocarditis(7). Therefore, some athletes and sports players where they need to extract more work from the organs than other may find hard to cope with the situation post infection even if they get discharged and completely treated. Lockdown and physical distancing norms

are affecting the exercise routines of the masses and needs to be substituted with another alternative(8).

COVID-19 AND DIABETES

One of the worst comorbidity or chronic underlying health condition with COVID-19 to have is diabetes. Diabetes is increasing day by day and grappling the world with its negative effects on health of the person. Diabetes do not come alone and brings other chronic illnesses such as hypertension, renal failure etc.(9). which are hard to cure and may prove fatal in long term. Once the diabetes happens to a person then that person has to live with it and take regular treatment. Study have found that a diabetic patient contracting COVID-19 infection develops severe symptoms and may take longer recovery time as compared to non-diabetic patient. Chance of needing ventilator support is five times more than the normal person if he or she has COVID-19 infection with diabetic retinopathy. The chances of blood vessel damage are high in type-1 as well as type-2 diabetes and thus take prolonged treatment to recover from the infection. In diabetes the blood sugar level along with insulin production is severely affected and thus impacting in the negative way on patient's health. It has very profound impact on weakening the immunity poor. Unmanaged blood sugar levels lead to lessen blood flow, flow of nutrients and other hormones to different parts of the body. It also delays the healing process therefore takes longer time to be fully recovered from the condition(10). Already the whole world is dealing with the increasing footprint of diabetes then this pandemic only added to the woes of the already existing problems. In COVID-19 times, those person controlled their blood glucose levels may find it difficult to maintain the condition as it is and their health may worsen(11). Diabetes may prove immune suppressant and invite secondary infection which may be prove

fatal in current pandemic scenario. The underlying vascular phenomenon that diabetes harbors creates cardiovascular impairment, chronic lung disease and so on hence it is said to be worst to have it. Pneumonia in COVID-19 have greater chance to develop if the person is diabetic. The most known fact about renal ailments is attached to diabetes and also a leading cause of deaths in COVID-19. Both the type-1 and type-2 diabetes have similar threats in pandemic situation. In study conducted in hospital of New York have found out that out of 5700 patients admitted to the hospital, 34 percent of them were diabetic and other major comorbidity were hypertension and obesity(12). There is no segregation of data on the basis of type-1 and type-2 diabetes mellitus but general medical observations suggested the type-2 diabetes patients were more as compared to their type-1 counterparts. Although the chances are not very much affected by the presence of diabetes mellitus but when infected with COVID-19 the symptoms are getting worse faster and critical care is needed in majority of the cases. Pro-inflammatory along with pro-thrombotic presence were observed in diabetic patients with COVID-19 infection, same were absent in non-diabetic counterpart. Also, there is remarkable difference in between diabetes patients. Patients which were following rules regarding the control of blood sugar levels were way less susceptible to severe condition in COVID-19 than those with uncontrolled blood sugar levels. Hyperglycemic condition observed in diabetic patients were associated to immunity dysfunction resulting into cytokine dysregulation. Corticosteroid therapy may induce the hyperglycemia, improper monitoring of blood glucose levels, less contact with health care professionals are some factors that may worsen the situation of the patient. Also, age-old patients with ongoing diabetes mellitus whether type-1 or type-2

are more vulnerable for developing severe symptoms. In an Italian study, 35 percent of case fatalities were harboring diabetes mellitus. Diabetic patients were over-represented in case fatalities. This has already confirmed that high mortality rate is associated with diabetic conditions and the relation among both is vast and multifaceted(13).

Diabetes does not only face risk during recovery, it faces risks post-recovery too. Therefore, the COVID-19 infection with type-1 or type-2 diabetes is highly disliked. Post-illness implications are there in influenza-like illnesses and respiratory distress syndromes. Previous outbreaks of severe acute respiratory syndrome (SARS) and Middle Eastern respiratory syndrome (MERS) have already established the long-term effects may be felt by recovered patients up to several years. Follow-up studies have shown the post-illness effects with including weakened physical capacity, weakening of heart muscles and much more. Therefore, it is bound to happen in COVID-19 too as the virus belongs to the same family. Another tension-creating aspect in diabetic patients is administration of steroid if they are infected with COVID-19. There is correlation between previous treatment course and insulin requirement in diabetic patients. The requirement of insulin shot up during mild illness only supposedly due to inflammation and stress factor. Glucose level may take longer duration to come to normal level post-illness. Strict assessment of blood glucose levels is needed to ensure safe post-illness period for the patient. Self-administering any medication may backfire in terms of health condition therefore it is advised to stay in touch of the doctor for any medical consultations whenever necessary(14).

If you are able to control your blood sugar level, chances are high that you may not get the infection if all other factors remain standard and favorable. Drinking plenty of fluids and staying from dehydration is one

way to ensure safe blood glucose levels. Avoiding any physical injury, bruises and minor cuts and cracks which includes bleeding. Maintaining minimum and safe personal hygiene will not only benefit in COVID-19 and to diabetic patients but it is the way by which one can ensure that they are prevented from contracting any viral disease(15).

PREVENTIVE MEASURES IN COVID-19

It is quite clear that having infected with COVID-19 while already undergoing with chronic illness of diabetes mellitus is a deadly combination all in negative sense. Even if one recovers with the infection of COVID-19 then also the post-illness disorders contain long list of impairment which can last for several years post-discharge. Therefore, it is important for diabetic patients to not get infected as there is only a losing side. Hormonal imbalance already is present and if the COVID-19 infection is there then the psychological impact can be so profound, it may take years to recover mentally as well as physically. Various methods are available and guidelines are in practice to safeguard ourselves from the disease. Governmental agencies and health authorities along with researchers and past experience of dealing with SARS and MERS which were also very contagious has laid out detailed safe practices to follow, to ensure you are safe from the infection. Especially diabetes mellitus has a curious case as they already need regular and proper medical attention. This pandemic has only strengthened the need of having a regulated lifestyle. Diabetes mellitus patients may start from not going outdoors at all if not necessary. Regular exercising at home with yoga and meditation will keep their blood sugar level manageable. Regular consultation with doctors can provide immense guidance on how to be at home with proper monitoring of the blood sugar

levels. Elderly may need additional manpower to nurse them with proper medications. But strict following of the guidelines must be ensured as infection is extremely contagious and proving deadly. Vaccine is not yet ready for roll out to all the people as some allergic reactions and contraindications have to be listed out and sort carefully. Therefore, preventive measures are the only viable option that one can follow with ensuring personal health safety. Supplementary diet which can improve immunity can be inculcated by diabetes patients and also can be used as prophylactics in the wake of pandemic. Vitamin C, Vitamin D and various other probiotics are meant to be increasing innate immune response, much needed in contagious pandemic like COVID-19. If it is unavoidable for the patient to go out then proper precaution must be followed in order to stay safe from the infection. Proper mask, gloves and personal and protective equipment (PPE) kit must be worn and touching public surfaces unnecessarily must be avoided(16).

DIABETICS AND TELEMEDICINE

The word "telemedicine" literally means "healing from afar." The WHO has described it as the "provision of health care services where distance is a key element, the sharing of good information for diagnosis, treatment, and injury prevention, study, and assessment by all health professionals using information and communication technology, and the continued education of providers, all in order for it to be promoted.

This can be categorized in accordance with the mode, time and intent of communication and communication participants.

1. Communication method:

a) Text: telemedicine chat-based apps, courtesy facilities, chat channels like Whats App, Google Hangout, Messenger Facebook, mail, fax.

(b) Video: Skype, Zoom, Facetime, Squad (iPhone).

c) audio: telephone, web protocol speech, audio applications.

2. Communications time:

a) Efficient Time / Sync: video, audio, text.

(b) Email: Asynchronous.

3. Consultancy purpose:

a) First consultation: any first-time consultant, or any follow-up patient who did not visit for 6 months or any follow-up patient who does not want to see the previous.

b) Follow-up consultation: patients consulted within 6 months.

4. Persons who work in telecoms:

a) Doctor-to-patient.

b) Doctor to caregiver.

(c) Physician to physician.

(d) Doctor-to-doctoral health treatment.

Diabetes is a chronic illness, requiring regular medical visits for lifestyle therapy and medication adjustment. Telemedicine will help you meet your doctor from the comfort of your home and away from the hospitals that may boost the chances of having a coronavirus infection. Doctors will communicate with patients, evaluate history, analyze and inform patients about their self-monitored blood glucose diagrams (SMBG) and SMBP values.(17) Several worldwide studies have previously evaluated the effectiveness of telemedicine in various clinical settings, especially with regard to a very particular health field, ophthalmology. In fact, in many clinical sub settings, teleophthalmology has been tested. In the United Kingdom, the largest survey of over 24,000 individuals found a consensus of 87% between optometrist and ophthalmologist (COHE's kappa =0:69). Similar conclusions were obtained in Kenya, where teleglaucoma showed 41.3% sensitivity and 89.6% precision compared to the regular fundus oculus test of a specialist in the field of eye care. In Canada, similar studies have been performed on creative mobile applications,

but pictures were ungradable in 24% of cases despite similar findings. However, Smartphone ophthalmoscopy has shown strong agreement with the screening with the split lamps for estimating vertical cup-to-disk ratios.(18)

Diabetes is more likely to suffer from serious COVID-19 infection and death. Frailty, co-occurring conditions and underlying dysfunction of the immune system can lead to poorer outcomes. We recommend that we continued regular diabetic treatment with telehealth-based assistance with a wider emphasis on sick day management and early detection and SARS-CoV-2 monitoring, where the blood glucose test can be allowed and increased to take account of everyday routine, nutrition and mental health adjustments. Patients with diabetes must be motivated to use technology to improve the healthcare services and add value during COVID-19. The effectiveness and problems of telehealth during the COVID-19 pandemic should be thoroughly assessed and further study is needed(19). Many interesting studies on diabetes and prediabetes were reported (20-23). Studies on different kind of risks in diabetics were reported by Lalwaniet. al. (24), Raja et. al (25), Ramani et. al, (26). Studies on Covid-19 and its effects on diabetes and treatment were reported (27-29).

CONCLUSION

It is found out that diabetes is one of the tops non communicable disease that kills many people every year. But combine with communicable disease like COVID-19 it may prove even lethal and more deadly. Already it is established by various studies. SARS and MERS have a lot to offer in terms of long-term illness and containment measures as they are similarly contagious. Diabetic patients need extra care and it goes on increasing with the age. Proper rehabilitation centers are the need of the hour especially for the COVID-19 infected diabetic patients as long-term

implications are far more worsening and needs extremely intensive rehabilitative care. Although it can be prevented from happening at first place by adhering to guidelines that tells people to wear mask, maintain minimum safe distance from fellow persons, not touching public surfaces. Curated diet can a game changer in terms of diabetic patients as some vitamins and probiotic rich foods have found to be extremely positive effects on innate immune response and overall well-being of the body. Mental fitness is quite neglected and pandemic has highlighted the need of mental rehabilitation for people affected by the pandemic. But inculcating good habits can prove to be good stimulant and making mood happy. Still not much of world is open completely so doing regular physical exercise at home itself, soaking under the sun can surely delight the mood. Yoga and meditation may induce calm composure which is necessary in the times of social distress. It is advisable to the diabetic patients that they stay home in order to minimize the health risks involve in going out. Alternative top access the medical counselling would be to take help of telemedicine. The technology is proving boon for all those vulnerable people who are vulnerable to go out in this contagious pandemic. At last prevention is always better than cure and it is highlighted by the pandemic by showing the long-term bad implications on health. It is our responsibility to inculcate good habits and help the governmental agencies in containing the menace of COVID-19.

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