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सरकारी एवं निजी विद्यालयों में कार्यरत् शिक्षकों की व्यवसायिक सन्तुष्टि का तुलनात्मक अध्ययन – **डा0 राहुल गुप्ता**	**55**

Physical exercise role in Type1 Diabetes: Care

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Abstract

Management of an Individuals with type1diabetes (T1DM) possess three essential pillars: insulin infusion, nutrition and regular physical exercise. Physical exercise concerned with metabolic strain depend on the energy storage and scale of physical conditioning changed according to the environmental condition, intensity, duration and forms of physical activity. All such factors makes an eventual distress with competition, expressed the glucose metabolism. Diabetic individual engaged with sports often noticed the risk of hypoglycemia during and after exercise while hyperglycemia before, during and after physical exercise turn into ketoacidosis and occurrence of the chronic microvascular and macrovascular state. Aerobic exercise decrease the blood glucose level while anaerobic exercise may accelerate hyperglycemic state. However individuals with diabetes perform excellent in a particular sport underlined the recommended guideline optimized by strict blood glucose regulation, including the adequate modification of insulin content per day with exercise and nutritional intake. The objective of this review is to explore the impact of physical exercise on glucose metabolism with nutritional intake and practice of physical exercise in an individuals with T1DM.

Keywords: Physical exercise, glycemic regulation, hypoglycemia, hyperglycemia, micro & macro vascular disease.

Introduction:

Therapeutic architecture of diabetes is comprises three different pillar, medication, nutrition and physical exercise. [1] In order to the platform of diabetic management, physical exercise is widely accepted along with other essential component. Number of individuals deals with diabetes regularly over the format of different forms of physical activities range from the participation in recreational

activities, games or school competition or even for awaited Olympic Games stating life. Athletic based activity are considered to be safe for an individuals with type1diabetes, offers number of benefits for player engaged in athletic games as a multidisciplinary team work followed exercise and reduced the incidence of hyperglycemic state. [2]. However during the exercise or competition, athletes suffered from the diabetes face challenges are need to deals with physiological requirement involved with the different pattern, intensity, such as nutritional demand, alteration of the meal schedule and physical distress linked with competition. [3] with the involvement of these factors, athletes with T1DM face a significant risk of hypoglycemia during and after the exercise. However hyperglycemic state before, during and after some forms of exercise insert the risk of ketoacidosis and chronic microvascular and microvascular disease may be hampered the career of athletes with type1diabetes.[4,5,6].

In spite of the very few well controlled studies acceleration the effective therapeutic value for the following of regular physical exercise, The objective of this review is to explore the impact of physical exercise on glucose metabolism with nutritional intake and practice of physical exercise in an individuals with T1DM.

Role of exercise variables:

The maintained of blood glucose level is the essential to the survival of an individuals and showed of an influence with the physical exercise modules by the type, intensity, duration and activity. In order to the participation of the various forms of exercise such as aerobic, sprint and resistance training makes variable results.[7,8] the exercise intensity always makes distinct outcome, while the intense activity stimulate counter regulatory impact such as to release of the hormone like epinephrine and glucagon that's shown of elevation of the blood glucose level.[9,10] in fact the duration of 10 second in sprint lasting effect on the blood glucose level. [9,11]exercise duration is the alternative parameter resulting in the longer period of glycemic influence in order to impact on the hypoglycemic level although longer duration, hormonal secretion, in the athletes with T1DM.[12,13]More than once in a day of exercise as well as blood glucose level

during exercise or afterward. [14] in order to a trained individuals with T1DM cultivate similar results as an individuals without diabetes followed the similar format, having the poor outcome. The sportsman or athletes engaged with the different format of the exercise with duration and intensity makes a complicated results even poor glycemic management. [15]

Person with T1DM makes unsatisfactory outcome underlined insulin level during and after the exercise unorganized, in order to the risk of hypo or hyperglycemia in early and late exercise expertise the hormonal glucose counter regulatory incidence. The consequence of early or late hypo or hyperglycemic incidence with moderate to vigorous exercise carry out in the afternoon or early evening . [16,17] the incidence of hyperglycemia late onset pattern and duration of exercise lasting from 90 to 120 minute defined the two fold incidence of hypoglycemia in adolescence and young one.[17]

Function of insulin regimens:

Glycemic controls with the physical exercise remain undefined by the different insulin concentration and infusion of insulin for an individual with T1DM. The mode of insulin followed basal-bolus techniques. [18,19] the approach based on the insulin pump using rapid acting insulin analogue are system to transfer small quantity of insulin commonly in small content to fulfill based need, in order to user programming of bolus amount used for the meal and other nutritional dose as per requirement. [20] in the clinical studies carried out in limited sample size for an adults with T1DM applying insulin pump therapy and followed regular to moderate intensity of physical exercise, recorded less post exercise hyperglycemia compared with multiple daily injection (MDI) without accelerating the susceptibility of the post exercise late-onset hypoglycemia. [21]. However using the insulin pump as therapeutic model instead of the multiple daily injection (MDI) experienced wide variability in glucose concentration before, during and after the physical activity. [22]

Future Technology: Management of Diabetes mellitus with physical exercise.

Modern era need to bring an innovative technique to the management of blood glucose level in patients with T1DM, while the numerous finding stating the way to overcome the challenges of optimizing glycemic control during and after physical activity undertaken by all age group of parson with T1DM. The integration of all such techniques and engaged with the smart technique to the management of the diabetes such as smart calculator, better closed loop system and other procedure endorse to learn social aspect permissible to meet the need of user.

Calculators for Physical Activity or Exercise

In the modern time insulin bolus calculators are existing maximum in the insulin pump that would be expertise the content of timing prior of the insulin dose, rate of absorption, insulin sensitivity and other correction factors. These calculators are also define the with the integration with the glucose meter and portable device applets for the applying as multiple daily injections [23]. However not a single these calculators in the modern time screening for the effects of physical exercise the possibly a correction of systemic percentage in the general measurement and they likely apply inappropriately minimum estimation of insulin action that can cause unrecognized contendof insulin carrying to unsatisfactory hypoglycemic incidence, while the exercise pattern would be variable. [24].

The principal objective of the excise calculator for T1DM is to be the management of hypoglycemic or hyperglycemic incidence during the physical exercise 24 to 48 hours period followed physical exercise. Hypoglycemic incidence develops during or immediate after exercise then reappears 7 to 11 hours after in biphasic manner. [25]. In order to most of the individuals experienced post active glycemic score during night. Blood glucose management refers to the intensive insulin infusion should be unrelated to the weight gain or number of the hypoglycemic state, which frequently mark fine tuning to the carbohydrate or insulin dose intake. [26]

In the predication of the blood glucose scale for the assessment of the calculator may be complicated by applying of the medication with insulin like component.[27] appearance of the diabetes like complication like gastriparesis which assess to infect about 40% of a patients with T1DM may bring the absorption of food erratic and delayed and blood glucose level is minimum predictable.[26,28]

Therefore exercise calculator has estimated to be beneficial for most of the activity but in some negativity is also elucidated.

1. In the general overview for the insulin and food intake to permissible for the arrangement prior to the beginning of physical exercise. [29]
2. Construct a specific recommendation for eh pattern linked on user input or assessment of physiological data in the actual pace linked with type, intensity and duration of physical exercise that carried out by an individuals.[30,31][12].
3. Make a modern recommendation for the execution of physical exercise modulated during the activity with alteration in duration, intensity or type.[32,33]
4. Assessment of the multiple factor responsible for the glycemic level response to the physical activity. [34]
5. In the assumption of the hypoglycemic in advance or the time factor based related to the Physical activity, in the prior insulin timing and dosage and organized the time from of food intake during physical activity and offer recommendation for its prevention during and followed time of activity. [35].
6. The prediction for the hyperglycemic state provide recommendation for the alteration to prevent or correct PH induced enhancement in glycemic state.[33]

1. [1]Temple MY, Bar-Or O, Riddell MC. The reliability and repeatability of the blood glucose response to prolonged exercise in adolescent boys with IDDM. *Diabetes Care*. 1995;18:326-332.

2. [2]Silveira AP, Bentes CM, Costa PB, et al. Acute effects of different intensities of resistance training on glycemic fluctuations in patients with type 1 diabetes mellitus. *Res Sports Med*. 2014;22:75-87.

7. Account for the utility for the medication or the incidence of diabetic complication that delayed the absorption of the carbohydrate intake for the maintaining Physical activity fluctuation.[36][3]
8. Risk factor linked with the perplexing outcome of prior hypoglycemic state and ;pyscia exercise consequently hypoglycemic associated autonomic fall down followed exercise.[34,37].
9. Endorsement of the prior input evens more intelligent recommendation for balancing glycemic event during physical exercise in identical framework.

Function of the artificial pancreas system

Its the characterization of the CGM (continuous glucose monitoring) device, in which insulin infusion via a pump and an algorithm control system to balance blood glucose level with very lesser or without user investment, thereby building an external device driven artificial pancreas system. Some experimental outcome recommended the dual hormonal delivery (insulin & glucagon) supposed to work efficiently to the prevention of hypoglycemia than insulin alone. [38-41] while others only focused on to developing the device encompasses on the asedon the insulin delivery only. [42-47]

The valuable data collected for a variety of the physical exercise regimen from the existing devices to creating a functional algorithm [48-51] the observational studies indicated physical activity related to the heart rate and or multisensory device like the body media arm band that reflecting accelerating closed loop control and enhance closed loop control and improve both at once hypoglycemia susceptibility of the latent effect. Using of the adaptive control and or predictive feature that will apply additional physical exercise invert a beneficial frame especially to anticipation of latent hypoglycemia. However a closed up system that generate by using CGM technologies and insulin infusion techniques will be lesser by poor insulin action and poor insulin clearance and lagging of glucose action in the state of fast negative rate of alteration. This supposed to infers AP system that are based solely on glucose action in case of fast negatively

3. [3]Tang M, Donaghue KC, Cho YH, Craig ME. Autonomic neuropathy in young people with type 1 diabetes: a systematic review. *Pediatr Diabetes*. 2013;14:239-248.

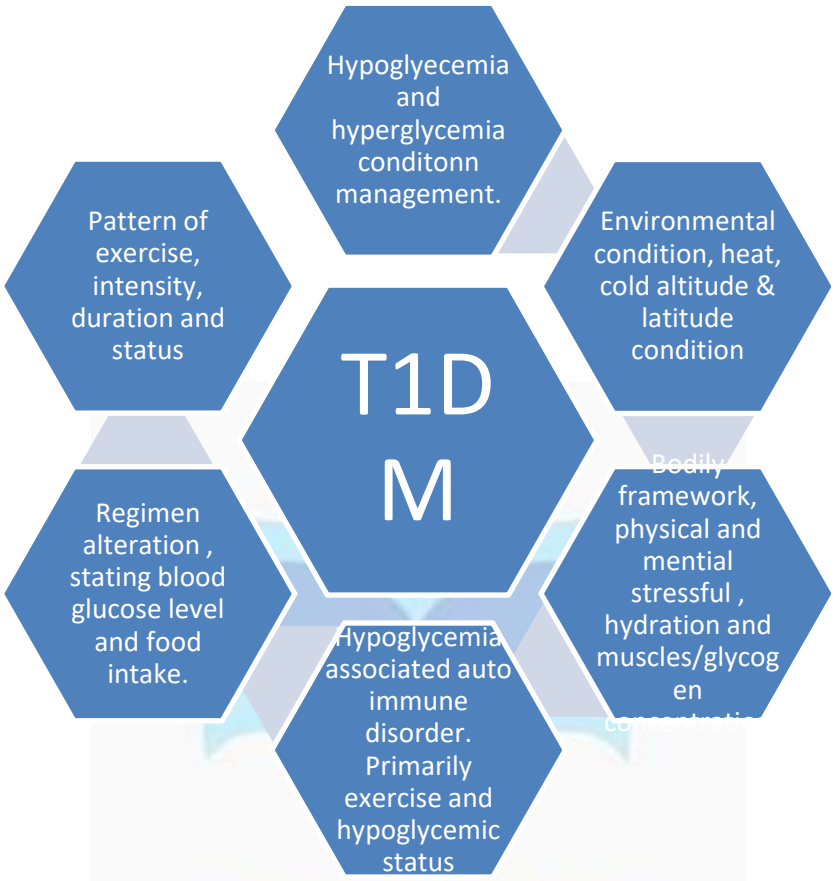
alteration. [52,53] physical activity variables pattern that implement and or exacerbated by activity encompasses the score of blood glucose and glyco0gen level applying during the physical activity, impact on the residual insulin being meet with the blood stream from subcutaneous depot and body in incapable to reply for the fatly alteration of blood glucose. [54-57]

Normal condition of artificial pancreas stated a closed loop system capable to manage with physical activity with the lesser or without user intervention. In recent observation on the adolescent and adults with T1DM engaged with closed loop insulin delivery system involved in the midafternoon exercise (brisk walking with moderate activity for 60 min) and notifying the lower the risk of the nocturnal hypoglycemia with ongoing exercise and enhance the percentage of the time spend in the defined glycemic range. [58]. Moreover the insertion of the heart rate system to the next closed up system further lower the risk of hypoglycemia during and after the physical exercise. [56]. The major challenges of the artificial pancreas followed on the subcutaneous delivery of moderate quantity of insulin and glucose sensing the system is being limitation even physical activity detected at the onset on the incidence likely to be too late prevention of acute onset of hypoglycemia without intervention of technology to the advancement of full closed loop artificial pancreatic system would perform in the optimal figure to make them exercise adjustment with the full performance.

Conclusion

Advancement of technology lead a valuable results for an individuals with diabetes, would be construct an impressive framework to the management of blood glucose fluctuation during the distinct pattern of physical exercise, technology is still inadequately functional to remove the risk of hypoglycemia, that is the suitable impediment to carrying out regular physical exercise with T1DM. The application of present and future technology will likely to accumulate more data to dealing with T1DM to transform physically active including optimal outcome for the competitive sports and exercise. In future modern technological application cover up a more prominent role for the management of blood glucose level in the patient with diabetes along with healthy individuals.

T1DM essential factor influence on blood glucose level



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