

DM, no other identifiable risk factors for DM were noted in this cohort.

Five patients required hospitalization for HHS or DKA and 1 patient was managed as an outpatient. Median random serum glucose on presentation was 761.5 mg/dl and median HbA1C on presentation was 11.5%. Significant dosages of parenteral insulin (0.45 U/Kg) was required for hospitalized patients during their inpatient stay along with immediately after discharge to control their hyperglycemia. Glutamic Acid Decarboxylase and Islet Cell antibodies were done for 2 of the patients and were negative.

Three of the patients who had follow up in 2 months showed improvement in their HbA1C (median of 7.1% [5.4–10.7]) and considerably diminished subcutaneous insulin requirement (0.2U/Kg). Two of these patients continued to follow up, and at 4 months from onset of DM, median HbA1C was 5.85% with insulin ceased. Of note, the patient who was lost to follow up was found to have an HbA1C improvement from 11.4% to 5.4% at the 2 month mark.

**Discussion:** Both SARS CoV1 and SARS CoV2 activates the RAAS, causing insulin resistance by altering insulin signaling and increasing oxidative stress leading to dysfunction of pancreatic beta cells. The inflammatory cytokine storm response seen in COVID-19 can also decrease skeletal muscle sensitivity to insulin and decrease peripheral glucose uptake. These mechanisms may be leading to the new-onset DM noticed in our COVID-19 patients. In addition, there may be a possible immune-mediated mechanism given the matched time line between the COVID-19 antibody life span and the duration of DM.

It is unknown whether this effect is permanent or temporary, although our results do support the latter. More studies that utilize a larger cohort and longer follow up are needed in order to get a better understanding of the mechanism of DM in COVID-19 infection.

## Diabetes Mellitus and Glucose Metabolism

### COVID-19 AND DIABETES

#### *COVID19 Induced Diabetes; New Type of Diabetes Mellitus? Viral Genetic Material a Step Towards Cure of Diabetes?*

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The worldwide pandemic of coronavirus disease 2019 (COVID-19), seen in multiple races, ethnicities, age groups, with various co-morbidities. The bidirectional relationship between COVID-19 and diabetes (DM) is already established. The associations of DM with a variety of virus infections have been reported previously. COVID-19 infection could be causally linked to new-onset of DM. We report 13 cases of new type of COVID-19 induced DM. While working in non-covid endocrine clinic we could notice 5 patients presented with fever and URI or osmotic symptoms or post URI cramps in legs. All 5 cases was having hyperglycemia with ketonuria and HbA1c more than 11% with fasting or premeal C peptide levels more

than 10 ng/ml. All five patients have new onset DM and they are neither obese nor having family history of DM. Presentation includes fever with cough and/OR osmotic symptoms with hyperglycemia, weight loss in weeks. Out of five, in four patients either RT PCR OR Rapid Antigen Test was positive. One patient presented with cramps in legs with past history of URI without fever. In her COVID 19 IgG antibody was positive. All patients initially treated with insulin but on follow up they are controlled with metformin plus gliptin. All patients have HbA1c less than 6.7 on follow up at 3 months. We have retrospectively analysed data at COVID hospital. We have used inclusion criteria as 1Not known diabetes 2Either RT PCR + ve OR COVID-19 Ag +ve OR HR CT SCAN show atypical pneumonia or COVID-19 Ab positive 3Presented as hyperglycemia RBG > 200 mg% 4HbA1c > 7 with Urine Ketones + Exclusion Criteria Received steroids in recent past <2 wk. Total 30 patients presented with hyperglycemia at admission in last one month (September). Out of these, 8 patients who are neither obese nor having family history of DM, nor received steroids in last 2 weeks. All 13 patients (5 + 8) are of new onset DM with BMI around 24, presented with ketonuria, with no family history of DM and who did not receive steroids. Hence we propose COVID-19 can cause switch in metabolism to form new type of DM. There are case reports published about COVID-19 induced DM with ketoacidosis. In another retrospective analysis of 658 COVID-19 patients, 42 presented with ketosis.(Am J Emerg Med 2020:S0735-6757(20)30488-5) Out of these 27 were newly diagnosed DM. But other features like BMI, family history of DM, C peptide levels, use of steroid are missing. We coined new type of DM which cause metabolic switch in metabolism leading to ketosis with HbA1c more than 11 & high normal C peptide requiring insulin initially but later controlled with metformin and gliptin with HbA1c less than 6.7!**We further propose that genetic material of virus can cause switch in metabolism, then why should not we use other viral genetic material to reswitch leading towards cure of DM. Further research is needed in this direction.**

## Diabetes Mellitus and Glucose Metabolism

### COVID-19 AND DIABETES

#### *Effects of Movement Control Order (MCO) During Covid-19 Pandemic on Patients With Diabetes Mellitus (DM) in Malaysian Tertiary Centers*

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**Introduction:** The Malaysian government implemented MCO or lockdown for nearly 3 months from 18 Mar to 9 Jun 2020 in response to the Covid-19 pandemic. This restricted access to usual food, workplace, and leisure sports,

and also led to reduced clinic attendance. The effects of MCO on patients with chronic lifestyle diseases like DM is unknown. **Methodology:** This is a cross-sectional study exploring effects of MCO on adult (>18 years) DM patients (both Type 1 and Type 2) attending endocrinologist-run DM clinics in 3 tertiary centres in Malaysia. Glycaemic and metabolic parameters were collected through medical record review while data on healthcare utilisation, dietary and lifestyle habits before MCO (17 Nov 2019 to 17 Mar 2020) and during MCO were collected by investigator-administered questionnaires during routine clinic follow-up after the MCO period (10 Jun to 30 Oct 2020). **Results:** From a total of 207 patients (56.5% female, 73.4% T2D and 80% on insulin) no significant difference between mean (SD) A1c [8.6(2.39) % vs 8.4(2.14) %;  $p=0.073$ ] or BMI [29.2(7.57) vs 29.4(9.23)kg/m<sup>2</sup>;  $p=0.968$ ] were seen before and during MCO respectively. More than 95% of the patients attended clinic before MCO and at least 20.3% saw either the DM nurse educator, DM pharmacist or dietitian. In contrast, during MCO only 31.4% of patients attended clinic and less than 10% had face-to-face consultation with the DM support team. More patients also reported missing insulin (11.6% vs 7.7%) and not checking blood glucose (17.9% vs 15.5%) during MCO. Before MCO, 61.8% of patients had home-cooked food daily. During MCO this increased to 83.1%. However, there was a trend towards unhealthy eating during MCO. Patients reported eating more frequently with those eating more than 4 meals a day nearly tripled during MCO (18.4% vs 6.8%). In addition, 22% of patients recalled consuming more confectionary; a similar percentage also reported higher consumption of processed food like dry snacks, canned food and instant noodles during MCO. Mean (SD) hours of sleep [6.8 (1.35) vs 7.2 (1.73) hours;  $p<0.001$ ] and screen time [3.3 (2.51) vs 4.51 (3.10) hours,  $p<0.001$ ] increased significantly during MCO compared to before. Notably, before MCO 44% of patients reported no exercise and this increased to 65.7% during MCO. **Conclusion:** Despite reduced clinic attendance and contact with the DM support team, there were no consequent significant change in A1c or BMI of our DM patients from the 3-month MCO in our short term study. However, a worrying increase in sedentariness and unhealthy eating existed. The imperative need to conduct work or lessons online, among others contributed to the inevitable rise in screen time and reduced physical activity. As the pandemic continues with imposed movement restrictions, the long-term implications of MCO to metabolic health warrant our attention. Innovative strategies to promote healthier living during MCO are urgently needed.

## Diabetes Mellitus and Glucose Metabolism

### COVID-19 AND DIABETES

#### *Endocrine Elective Primer for Medical Students*

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**Background:** Endocrine modules available online have shown improvement in student learning and increased student satisfaction with self-guided learning (Kirk, 2016).

However, most available modules are geared towards pre-clinical medical students rather than clinical students. Therefore, we developed an endocrine primer, defined as a set of introductory preparatory material, in the form of a PowerPoint. The primer reviews commonly seen endocrine disorders in adults, including their presentation, diagnosis, and management, in order to offer students access to self-paced learning and help bridge the gap between the basic science curriculum and clinical experience.

**Methods:** Third and fourth year medical students enrolled in the endocrine elective from Feb 2020-Oct 2020 completed a 15 question pre-and post-knowledge assessment, as well as an endocrine primer satisfaction survey. The knowledge assessments evaluated students' knowledge of topics surrounding type 1 and 2 diabetes, hyper- and hypothyroidism, thyroid nodules, adrenal and pituitary disease, hyperparathyroidism, and osteoporosis. The pre-knowledge assessment was completed prior to starting the endocrine elective and viewing the endocrine primer. The post-knowledge assessment was completed at the end of the two or four week endocrine elective.

**Results:** A paired-T test was used to compare the pre-and post-knowledge survey results. A total of 7 third- and fourth-year medical students completed the knowledge assessment and satisfaction survey. Knowledge results showed a nonsignificant mean improvement of 1.4 points,  $p=0.09$ , from the start of the elective to completion, with a decreased variability between student scores. Student satisfaction was high, with 100% of students who completed the primer agreeing it made them more prepared for the endocrine elective and all students recommending other electives create similar primers as well.

**Conclusion:** The endocrine primer standardized students' endocrinology knowledge and enhanced satisfaction with the endocrinology elective. This self-paced learning opportunity was well received by medical students and should be included in other clinical electives. This pilot study will be expanded to a larger sample size and incorporate internal medicine residents on the endocrinology elective. We also plan to review faculty satisfaction before and after the primer was initiated.

## Diabetes Mellitus and Glucose Metabolism

### COVID-19 AND DIABETES

#### *Endocrinology in the Time of Coronavirus: A Virtual Endocrinology Elective for Medical Students*

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**Introduction:** During the COVID-19 pandemic, the Association of American Medical Colleges recommended that medical students halt in-person learning. Our institution created a competency based virtual endocrinology elective to provide continued clinical experience with a focus on type 2 diabetes (T2DM) and health equity in diabetes care.

**Methods:** A 4-week virtual endocrinology elective alternated between different mini-rotations to maximize exposure to inpatient and outpatient endocrine care, as well as self-directed and faculty/fellow directed educational