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Resilience through Yoga: COVID-19 Incidence and recovery among practitioners of Yoga with Type 2 diabetes mellitus for a long term

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Abstract

Background: Incidence of COVID-19 and time taken for recovery is reportedly higher among people with type 2 diabetes (T2DM). We in this study hypothesized that Yoga practitioners with T2DM have lower incidence and get recovered in optimum time (14-18 days) as compared to the latter.

Materials and Methods: This cross-sectional study was conducted online during the lockdown related to COVID-19 (CoV-19). Data was collected from Male (n=33) and female adults (n=33), (N=66, age range: 40-60 years) with T2DM for a duration of 8.5 ± 8 years. Close to half of them were practitioners of yoga (YPs) (n=32) and the rest half were non-yoga practitioners (NYPs) (n=34). Middle and elderly adults with T2DM for 5 to 10 years, practitioners of Yoga (>3 years), never practiced yoga, knowing English, were included. Those with systemic complications, and residing in Bengaluru for less than 10 years were excluded.

Results: Close to three-fourth of the YPs (n=23, 71.9%) continued practicing yoga, and the rest of them discontinued during the peak of CoV-19. Among NYPs, more than one-fourth (n=10, 29.4%) of them tried joining for virtual yoga training programs, but couldn't for multiple reasons. Fear of getting infected with CoV-19 was high among both YPs (n=26, 81.2%) and NYPs (n=26, 76.5%), (p=0.047).

Conclusion: Interestingly, YPs had a lower incidence of CoV-19 and with a recovery period not longer than the NYPs. YPs were with a better body weight management and psychological wellbeing than the latter. Summing up, Yoga might have helped in resilience among YPs with T2DM.

Keywords: COVID-19 incidence and recovery, psychological wellbeing, yoga

1. Introduction

Type 2 Diabetes Mellitus is a disorder associated with multiple systemic issues which results in glycemic mismanagement when getting subjected to infections (Esakandari *et al.* 2020) [3]. According to the scientific reports so far, people with comorbidities like type 2 diabetes mellitus (T2DM) are at higher risk for getting infected for CoV-19 (Fang, Karakiulakis, and Roth 2020) [5]. Furthermore, they are with two times higher risk for mortality (Selvin and Juraschek 2020) [11] (Azar *et al.* 2020) [1] than normoglycemic individuals. Likewise, as per one of the studies conducted Africans reported that people with Diabetes and hypertension (Singh *et al.* 2020) [12] and other cardiac issues get subjected for high risk for contagious infections like CoV-19 (Lukman *et al.* 2020) [8].

Studies already reported that people with endocrine disorders related compromised health are highly vulnerable to infections (Chatterjee 2020) [2], with poor recovery once infected (Ghosh *et al.* 2020) [6]. There are nine articles found reporting higher incidence of CoV-19 among people with type 2 diabetes. However, there are no other studies found assessing and reporting the incidence and period of recovery from CoV-19 among people with type 2 diabetes who are practitioners of Yoga and the period of recovery from CoV-19. Hence this survey was conducted to examine the incidence, period of recovery and extend to which CoV-19 affects the emotional wellbeing of individuals with diabetes who are practitioners of yoga as compared to the non-yoga practitioners.

Fascinatingly, our study fits within the larger body of research exploring the benefits of yoga as a complementary and alternative medicine for individuals with type 2 diabetes tested positive for infections like CoV-19. Having known the growing interest of researchers in estimating the potential role of yoga and other holistic approaches for managing type 2 diabetes, due to the limitations and side effects of conventional treatments, during the peak of CoV-19, the present study was implemented. The research problem addressed by this study is will yoga help in resilience and maintaining physical and psychological health and improve adaptability among the study population during the peak of CoV-19 pandemic. Also, the present study intends to signify the importance of yoga to help people with T2DM manage their health associated with the pandemic. As CoV-19 is still a public health emergency, the goal of our study is to propagate the benefits of yoga for individuals with T2DM, particularly in terms of promoting resilience and better health outcomes during the CoV-19 pandemic.

2. Methodology

This cross-sectional study was conducted online and assessments were done using a checklist circulated among the interested subjects fitting into the inclusion and exclusion criteria via Google form. Data was collected from adults with type 2 diabetes, who are practitioners of yoga and who have never practiced yoga, regular with checking their capillary Fasting blood sugar (CFBS) and capillary post prandial blood sugar (CPPBS) in not longer than 2 days and HbA1c in a month, residing in Bengaluru for more than 5 years.

2.1 Participants

This online survey study was conducted on Adults of age range: 40-60 years (N=66; mean age 52.8±4.9 years. Among them, half of them were male (n=33, 50%) and the rest half were female (n=33) with type 2 diabetes for a duration of 8.5±8 years. The aim of conducting this study was to estimate the incidence and period of recovery from CoV-19, among people with T2DM who are YPs as compared to NYPs. Also, the study aimed at understanding the extent to which CoV-19 pandemic affected physical, mental and emotional wellbeing among the participants. The responses were obtained during May to September 2021.

2.2 Assessment

Assessments were done using a 20-item self-report survey was developed specifically for the present study to collect the

following data on the participants: (a) Type 2 diabetes duration, last recorded CFBS, CPPBS and HbA1c readings (b) Sociodemographic data (sex, age, height, weight, educational level, having suffered with CoV-19 during the lockdown, if yes- recovery in how many days, and having lived in the same place as someone who suffered it), fear of being infected; mode of meeting the doctor, mode of availing medications, changed the doctor in last 1 year?; (c) information about their weight assessed through a scale (changes in weight in number of kilos gained/lost); (d) changes in their eating habits (general eating habits, the quality and variety of the diet, the amount of food ingested, meal times, and the effect of anxiety on eating habits); (e) changes in the physical activity (frequency and number of hours a day) and (f) changes in the sleeping habits (quality and quantity of sleep) and average sleeping hours, (g) stress, anxiety, depression and related psychological health.

It was expressly stated in the Google form that participation was voluntary, and that the information collected would be confidential and used for research purposes only. Responses were coded anonymously using individual identification numbers. Only those who marked "Yes" in the informed consent on the first page of the online form were with access to the further pages in the Google Form. Besides, marking a response and answering a question was required in order to move to the next one, and only complete forms were recorded in the database. Together with the fact that no participants were paid or received any academic benefit for their participation, anonymity was maintained aiming at addressing potential bias. In order to avoid duplication of subjects, participants were only able to complete the survey just once. The total time taken per person to complete the survey is 15-20 minutes.

2.3 Data collection and analysis

Data was collected using a Google form from known yoga practitioners with type 2 diabetes who had visited S-VYASA's holistic health care home Arogyadhama, Jigani, Bangalore, pre-COVID and non-yoga practitioners known to them and the investigators of this study. Data which was extracted from the Google spread sheet, was imported to Microsoft excel version 2016 and the statistical analysis was done in SPSS version 23.0.

Results

Demographic Details

Table 1: Demographic Details

| Sl. No | Particulars | Number (Percentage) |
|-------------|--|---------------------|
| a | Duration of type 2 diabetes | |
| | 7 years | 19 (28.9) |
| | 8 years | 11 (16.7) |
| | 9 years | 18 (27.2) |
| | 10 years | 18 (27.2) |
| b | Engaged in what type of Physical activity | |
| b.1. | Yoga group (Were already practitioners of Yoga) | |
| | (n=32) | |
| | Continued Yoga during CoV-19 lockdown | 23(71.9) |
| | Physical activities (PA) other than Yoga | 4(17.4) |
| | Discontinued Yoga and involved in other PAs | 7(21.9) |
| b.2. | Non-Yoga group | |
| | (n=34) | |
| | Physical activity (PA) | 16 (47) |
| | Occasionally involved in walking or other activities | 9(26.5) |
| | Occasionally involved in walking or other activities | 6 (17.7) |
| | No Physical activity | 3 (8.8) |

| c | Habits (only among Male) (n=33) | |
|---|--|-----------|
| | Smoking | 12 (36.4) |
| | Alcohol | 8(24.2) |
| | Other habits: | |
| | Television | 45(68.2) |
| | Other electronic devices for entertainment | 13(19.5) |
| | Reading books | 3(4.5) |
| | Day time nap | 23(34.8) |
| d | Medications | |
| | Insulin | 33(50) |
| | Oral hypoglycemic drugs | 66(100) |
| | Homeopathy, Ayurveda, Naturopathy, Unani, Siddha | Nil |

The glyceamic parameters at the time of reporting confirmed that the subjects were with type 2 diabetes (N=66; CFBS: ± 36.7 mg/dl, CPPBS: 190.8 ± 55.9 mg/dl, HbA1c: $8.3 \pm 7.4\%$), being with diabetes for a duration of 8.5 ± 8 years. Interestingly, as per the reports, none of them had changed their physician in close by time and all of them had either the physicians or their office assistants contact details. And, close to one-half of them (n=32, 48.5%) were Yoga practitioners and the rest of them were non-practitioners (n=34, 51.5%). Majority of the participants were working professionals (n=51, 77%).

3.2.1 Physical activity

Among the subjects of yoga group, almost three-fourth of them (n=23, 71.9%) continued practicing yoga, though majority among them opted for yogic breathing or *pranayama* than physical postures or *āsana*s and the rest of them discontinued the practice. And few of them even joined for online aerobics (n=3, 9.4%) and cardio exercises (n=1, 3.1%). Of the subjects of non-yoga group, almost one-half (n=16, 47%) of them were involved in indoor exercises like jogging, climbing stairs up and down and so and the same subjects had got interested in learning yoga and more than one-fourth (n=10, 29.4%) of them tried finding virtual yoga training programs and none of them got enrolled, due to personal reasons.

3.2.2 Incidence of CoV-19

Among the subjects of yoga group, close to one-half of them (n=24, 46.9%) got tested positive in rapid antigen test (RAT) and except for three, rest other (n=21, 65.6%) were RT-PCR tested positive for COVID-19 with a combination of symptoms like fever, dizziness, confusion, breathlessness, dry cough, diarrhea, fatigue, loss of smell (anosmia) and taste (ageusia). All of them were symptomatic and got symptoms lighter in 11-13 days and got fully recovered in 14-20 days. And, all of them availed tele-medicine and none of them got hospitalized. Additionally, as per the response almost all of

those remained not positive for CoV-19, doubted if they had COVID-19 and were asymptomatic. None of the YPs who were tested positive for COVID-19 had practiced *yoga asana*, rather they practiced *pranayama* or meditation occasionally only during the course of tele-treatment, which is mostly due to the irritation, fear of recovery, ill feeling, lack of motivation or low feel and lack of energy due to low appetite. Whereas, all others who were self-reported as asymptomatic had either practiced yogic breathing known as *pranayama* like *Bhramari pranayama*, and/ or *yoga asana* to adapt themselves appropriately to the fear of being infected with the pandemic or if they are really infected to get recovered from ill effects. None of the YPs were on Insulin, though all of them were on Oral hypoglycemic drugs (OHDs).

Simultaneously, among NYPs, more than one-half of them (n=18, 52.9%) got infected with COVID-19 in both RAT and RT-PCR and took a longer recovery time (18 to 30 days) than YPs. Similar to the report from the subjects of yoga group, those who had fallen to non-yoga group not tested positive for CoV-19 also could get to feel that they were infected but with no symptoms. Also, less than one-fourth of them (n=6, 17.6%), were with symptoms and had not gone for a rapid antigen or RT-PCR test, rather they were on self-medication and took even more longer period for recovery (25-35 days) and were feeling terrible with blood sugar mismanagement. Among this group, half of the subjects were on Insulin and OHDs and the rest half were only on oral hypoglycemic drugs.

3.3.3 Body weight

The subjects of both yoga and non-yoga group reported that they couldn't have a control over the body weight, rather there was a terrible fluctuation. Like, majority of the subjects who got tested positive for CoV-19 had a weight loss. Whereas the subjects of the other group experienced a weight gain in the lockdown period. However, there is no numerical data supporting the same (Table 2).

Table 2: Linear regression analysis examined within group gender interaction and between group genders effects of parameters checked among the subjects.

| Parameters | | Within subject (group*gender) effect significance | | Between group effect significance | |
|--------------------------|---|---|---------|-----------------------------------|---------|
| | | F value | p value | F value | p value |
| Body weight | Decreased | 4.989 | 0.008 | 16.422 | <0.001 |
| | Increased | 6.011 | 0.066 | 11.102 | 0.053 |
| Blood glucose monitoring | Increased | 0.996 | 0.372 | 15.081 | <0.001 |
| | Started checking by self for the first time | 3.116 | 0.048 | 0.978 | 0.027 |
| Psychological wellbeing | Feeling anxious & irritated | 2.204 | 0.115 | 8.253 | 0.006 |
| | Feeling low/sad/depressed | 2.959 | 0.006 | 1.505 | 0.002 |
| | Stress | 1.873 | 0.158 | 5.035 | 0.028 |
| Spending most of the | Watching Television | 2.839 | 0.002 | 0.524 | 0.472 |

| | | | | | |
|--------------------------|---|--------|--------|-------|-------|
| time of the day | With family | 0.025 | 0.05 | 0.386 | 0.537 |
| | Office work | 4.96 | 0.008 | 5.169 | 0.026 |
| | developing new habits | 1.884 | 0.156 | 7.152 | 0.01 |
| | Reading books | 4.552 | 0.012 | 0.569 | 0.454 |
| | Mobile& other electronic devices | 1.505 | 0.226 | 1.107 | 0.297 |
| Availing medicine | Online | 9.829 | <0.001 | 0.724 | 0.398 |
| | Phone call | 14.139 | <0.001 | 0.378 | 0.541 |
| | In person or family going to medical store/ hospital | 15.661 | <0.001 | 0.053 | 0.818 |
| | Tele-medicine | 7.256 | 0.009 | 5.807 | 0.019 |
| Sleep | Satisfied | 4.158 | 0.046 | 3.638 | 0.061 |
| | Feeling to sleep longer | 0.214 | 0.646 | 1.14 | 0.29 |
| | Nocturia | 1.565 | 0.216 | 6.948 | 0.011 |
| | Obstructed sleep apnea with fear and worry of getting infected with CoV-19 pandemic | 0.303 | 0.584 | 0.303 | 0.584 |
| Approach towards CoV -19 | Fear of getting infected | 0.156 | 0.006 | 4.11 | 0.047 |
| | Sure about getting CoV-19 | 4.35 | 0.041 | 7.865 | 0.007 |
| | Faith of getting recovered if infected | 1.032 | 0.314 | 4.036 | 0.049 |
| | Sacred of losing life in corona pandemic | 6.152 | 0.016 | 5.248 | 0.025 |

3.3.3 Blood glucose monitoring

Less than one-fourth (n=5, 15.6%) of the YPs and NYPs (n=6, 17.6%) responded as if there was an increase in the frequency of blood glucose monitoring during the lockdown. Whereas, rest others reported that, they restricted themselves from the check as like pre-CoV-19 due to difficulty availing the strips and visiting a lab ($p<0.001$) (Table 2).

3.3.4 Habits

The assessment on habits checked among male subjects showed that there was a reduction in alcohol consumption and smoking among the participants of Yoga group from 11% to 8%, whereas, the same was found to have increased among the subjects of Non-yoga group from 19% to 21%. The results also showed that, 10% of the YPs and 18% of NYPs had started feeling to smoke or drink for the first time (0.033) (Table 2) during CoV-19 peak. Interestingly none of the subjects of both the groups have started to drink or smoke for the first time during CoV-19 related lockdown. Also, 28% of the people in general had reduced smoking frequency ($p=0.006$). But, alcohol consumption has increased from 5% to 14% among the subjects in general ($p=0.002$) (Table 2).

3.3.5 Psychological wellbeing

One of the important factors of focus of this survey was psychological wellbeing which includes emotional wellbeing too, trying to self-determine the stress, irritation and sadness or feeling low among the subjects during the pandemic. The stress level was found to have increased among the subjects of Yoga group from 11% to 20% and from 12% to 23% among the subjects of non-yoga group ($p=0.028$). Alike stress, feeling low or depressed among the subjects was found to have increased from 7% to 9% among YPs and from 14% to 32% among NYPs ($p=0.002$). Worries, irritation and agitation were found to have increased from 4% to 12% among YPs and from 14% to 25% among NYPs during the peak of COVID- 19 pandemic ($p=0.006$) (Table 2).

3.3.6 Availing medications

Interestingly the study results revealed that even during the pandemic, close to one-fourth of YPs (n=6, 18.8%) and NYPs (n=8, 23.5%) were still going to hospital for availing medical care during the COVID-19 pandemic ($p=0.818$). Whereas, others were opting to get medications by ordering online and through phone calls even before the pandemic itself which they continued during the lockdown. Nonetheless, there was no statistical significance observed in the analysis (Table 2).

Tele-medicine and tele-consultation

Research shows that the use of health care providers by people with diabetes is important for diabetes management and to control associated complications (Ghosh *et al.* 2020) [6]. And among the subjects of Yoga group, less than one-fourth (n=5, 15.6%) of the subjects were already making use of telemedicine-based services before the pandemic which increased to 20% at the time of reporting ($p=0.019$), (Table 2). Whereas among NYPs none were making use of such facilities before the onset of CoV-19 pandemic.

Among YPs, more one-fourth of them (n=12, 37.5%) were consulting with their physician via voice calls and their queries were mainly about the dosage and diet, however, majority (n=7, 21.9%) of them reported that the service was not satisfactory as many of their queries were not addressed. The rest of them reported that they did not try contacting or were not in a need to consult their physician. Whereas among NYPs, more than one-half (n=21, 61.8%) of them got to interact with their physician through voice and WhatsApp calls but except for two, none others were satisfied with the tele- communication.

3.3.7 Fear of getting infected with CoV-19

As per table 2, the fear of getting infected with CoV-19 was reported among majority of the YPs (n=26, 81.2%) and NYPs (n=26, 76.5%) ($p=0.047$). Although, almost all of the subjects responded as if they were definite about being getting corona positive and the fear led them to turn positive for CoV-19 infection ($p=0.007$) (Table 2).

3.3.8 Faith in recovery

Faith in getting recovered after getting infected is found among less than one-fourth (n=7, 21.9%) of the YPs and more than one-fourth of (n=11, 32.4%) of NYPs ($p=0.49$) (Table 2).

3.3.9 Fear of losing life with CoV-19

Fear of losing life with corona which was found in very few (n=2, 6.3%) subjects of Yoga group and (n=4, 11.8%) of the subjects of Non-Yoga group ($p=0.025$) (Table 2).

4. Discussion

Since the time of onset of CoV-19 pandemic, people with metabolic disorders are found reporting their worry about the health management (Zhang *et al.* 2020, Pollán *et al.* 2020) [16, 10], which was pretty high among working professionals with Type 2 diabetes. With the present survey, the authors could understand the impact of CoV-19 on various aspects like body weight, incidence, period of recovery, and use of tele-

medicine, fear of being infected and psychological wellbeing among people with type 2 diabetes who are practitioners of yoga as compared to that of the latter. Studies already reported high stress, anxiety and distress among people with T2DM during the pandemic (Wilson *et al.* 2020) ^[14].

Glycemic variability among people with T2DM is reportedly a major risk factor for high morbidity among those tested with CoV-19, in addition to poor prognosis (Fadini *et al.* 2020) ^[4]. This is possibly because of having abstained themselves from outdoor activities like walking due to the restrictions imposed by the concerned. Even if not, those who were habituated to indoor activities were found restraining themselves during the lockdown, due to many known and unknown reasons. This might result in impaired blood glucose level, and low immunity (Huang, Lim, and Pranata 2020) ^[7] even leading to either high risk for systemic complications or fatality (Pal and Bhadada 2020) ^[9]. Even reports showed that the use of drugs like Corticosteroids, Lopinavir, Ritonavir for treating CoV-19 contributes to worsening of glycemic balance thereby exacerbating the severity of CoV-19 among type 2 diabetes (Yang *et al.* 2006) ^[15].

Further, it is important that patients with diabetes mellitus should maintain their blood glucose level, as impaired glycemic status may increase the risk for infections and poor recovery (Wicaksana *et al.* 2020) ^[13]. Adopting Yoga and Yogic way of life is known to improve the immunity and speedy recovery. But, in this study we saw both yoga and Non-yoga practitioners with higher incidence for CoV-19. Moreover, the recovery period was not so long among YPs. Whereas, NYPs took a longer period to come out of the infection. In addition, the weight management and emotional wellbeing was better among YPs as compared to NYPs.

Moreover, in this study we found that more of the incidence of CoV-19 was among NYPs. Interestingly, a few of the subjects who were working professionals, have had made use of tele-medicine even before the onset of the pandemic, showing the higher standard of living among the working professionals. However, this study overviewed the need for a better acquaintance to quality health care services among both Yoga and Non-yoga practitioners with Type 2 diabetes mellitus.

One of the major limitations of this study is having not used any questionnaires or any biological variables. One of the strengths of this study is that the authors knew the Yoga practitioners prior to this study and hence convincing them to take part in this survey was not a hard task. And the non-yoga practitioners were very new to us, still the authors could convince them to take part in the survey.

5. Conclusion

This study provides preliminary evidence that practice of yoga helped in resilience among people with T2DM, during the CoV-19 pandemic by lowering the incidence and speeding up the recovery time. The study also projects the potential role of Yoga in helping maintain body weight and psychological well-being. These findings postulate the need for further research on understanding the benefit of the practice of Yoga on adaptability and how yoga brings resilience among individuals with T2DM tested positive for CoV-19.

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7. Conflict of interest

There is no conflict of interest reported by any of the authors of this study.

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