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Research Article

Ramadan Fasting and Religious Beliefs and Practices amongst the Muslim Diabetic Patients during COVID-19 Pandemic

Ülkü Demirci[1]* and Ayşegül Kaptanoğlu[2]

[1]*Department of Nutrition and Dietetics, Faculty of Health Sciences, İstanbul Aydın University, Istanbul, Turkey*

[2]*Department of Health Management, Faculty of Health Sciences, İstanbul Aydın University, Istanbul, Turkey*

***Corresponding Author:** Ülkü Demirci, Department of Nutrition and Dietetics, Faculty of Health Sciences, İstanbul Aydın University, Istanbul, Turkey.

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Abstract

Background and aim: Despite the increased risk of diabetes and the associated complications, many Muslim patients suffering from type 2 diabetes mellitus (T2DM) prefer to observe Ramadan fasting. For the better understanding of the patients' perspective regarding fasting and help physicians offer better patient-centric care, we evaluated the religious and Ramadan fasting beliefs and practices of diabetic Muslims through this study.

Methods: A set of 150 Muslim subjects with T2DM, voluntarily participated in this cross-sectional study. The subjects were given an ad-hoc questionnaire comprising of total 40 items, divided into two subscales to investigate: (a) Ramadan fasting beliefs and practices; (b) Religious beliefs and practices.

Results: The patients' mean age was 52.08 ± 11.11 years. They fasted for 27.85 ± 2.31 days. The overall Cronbach's alpha coefficient (α) had excellent reliability at 0.91. The multivariate analyses indicated that subsequently adjusting for confounders, employment status [beta standardized coefficient (β) = 0.060; T = 0.843; P = 0.000], age (β standardized coefficient = -0.142; T = -1.658; P = 0.001), educational level (β standardized coefficient = 0.045; T = 0.637; P = 0.002), fasting and religious beliefs and practices (β standardized coefficient = -0.199; T = -2.917; P = 0.004), and diabetes complications and comorbidities (β standardized coefficient = 0.194; T = -2.775; P = 0.006) significantly governed the total count of fasting days.

Conclusions: Both Ramadan and religious beliefs played a significantly influential role in the decision-making process of diabetics who decided to fast during Ramadan. However, more studies need to be done in this area.

Keywords: Humans; Islam; Diabetes Complications; Fasting; Surveys; Questionnaires

Introduction

Fasting in the sacred month of Ramadan is considered a pillar of Islam and is, therefore, an obligatory religious ritual to be followed by healthy adult and adolescent Muslims. Ramadan is not only a period for spiritual growth but is a time for celebration and bonding with family and friends. During fasting, Muslims can eat as many meals per day but only at two times; ahead of sunrise (called sahur), and the other one following the sunset (called iftar), and refrain from eating, drinking, smoking, and taking oral medicines for the rest of the day [1,2]. The duration of this intermittent fasting may vary from 12 to more than 20 hours for 29-30 days; however, this variation depends on the season and geographical location as well [3]. It is estimated that more than 1.6 billion Muslims fasted during Ramadan in the year 2020 [4]. Despite the fact that the Quran has exempted certain people from fasting such as children, those who are sick or chronically ill, are expecting or pregnant or menstruating women, breastfeeding, frail, and the elderly [5-8], many Muslim patients with either type-1 diabetes mellitus (T1DM; 43%-80%) [9-11]. or type-2 diabetes mellitus (T2DM; 79%-95%) [9,12-14]. fasted during Ramadan for a minimum of 15 days [9].

Diabetes is a major health problem, affecting approximately 537 million (10.5%) people worldwide between the ages of 20 and 79. Diabetes is a major health problem, affecting approximately 537 million (10.5%) people worldwide between the ages of 20 and 79 years [15]. The burden due to diabetes is higher in Muslim

countries such as Kuwait (21.1%), followed by Lebanon and Qatar (20.2%), Saudi Arabia, Bahrain, and the United Arabian Emirates (with a prevalence rate of 20.0%, 19.9%, 19.2% respectively) [16]. Fasting involves a lot of changes in the daily routine and approximately half of the diabetic patients were found to decrease their physical activity, duration of sleep, intake of food, and fluids during the Ramadan fasting period [9].

Few studies have reported that in healthy individuals, Ramadan fasting did not cause any adverse health effects [17,18]. It is associated with significant weight loss, improvements in blood pressure, insulin resistance, glucose homeostasis, estimated glomerular filtration rate, cardio protection, and cognitive disorders such as Alzheimer's and stroke [19]. Additionally, keeping fast in Ramadan has demonstrated to restore immunity [20,21], especially during the COVID-19. A decline in excessive production of pro-inflammatory cytokines (such as IL-6, IL-1β, and TNF-α); also called the 'cytokine storm', C-reactive protein (CRP) [19,20,22-25] and pro-inflammatory chemokines (CXCL1, CXCL10, and CXCL12) [24] has been observed after Ramadan fasting that leads to damage of the lungs in COVID-19 patients.

On the other hand, in diabetics, Ramadan fasts may result in an extensive shift in glucose levels, thereby increasing the short-term risks of hypo/hyperglycemia, hypotension, ketoacidosis, dehydration, thrombosis and long-term issues such as reduced quality of life, mortality, and morbidity [9,14,26-303]. A patient's decision to skip, stops, or reduce the dosage and time intervals of medicines without medical supervision may lead to complications in diabetes. Also, not discussing fasting or restraining oneself from visiting healthcare professionals (HCPs) due to their negative views or their lack of understanding of the importance of Ramadan fasting [31-34] amay also affect one's health.

Despite the known risks, several factors such as religious beliefs, feelings of guilt, shame, perception of social stigma, and pressure from family and community may influence even unhealthy individuals to fast [35]. Given the lack of available knowledge, this study was conducted with the purpose of assessing the common Ramadan fasting and religious beliefs and practices amongst Muslim patients who are diabetic during the COVID-19 pandemic.

Methods

Research design and subjects

This was a survey-based, cross-sectional, and retrospective study conducted from April 02, 2021 to May 02, 2021. A total of 150 Muslim subjects having type-2 diabetes, visiting private diabetes clinics in Istanbul were enrolled in this study. Exclusion criteria were the patients, who had diabetes other than type-2; or those unwilling to partake in the study.

Data collection

For the present survey, information was collected using a study-specific, pre-designed (based upon the literature review, focus groups, and the committee of experts), and structured ad-hoc questionnaire that was pilot-tested on a small sample of 150 Muslim diabetics. The questionnaire was reviewed by the expert panel to assess the readability and clarity of the questions. The final version adopted contained a brief section regarding the details of the subject's socio-demographic profile such as the age, gender, family status, occupation status, educational qualification, and disease type (with complications or comorbidities). Another section comprised 40 items and was divided into two subscales to investigate: (a) Ramadan fasting beliefs and practices; (b) Religious beliefs and practices.

Ethical clearance

The study took its ethical clearance from İstanbul Aydın University Social Sciences Ethics Committees. The Ethical Committee of Hürrem Sultan Hospital, Istanbul approved the study protocol. Each participant signed the consent form. Parents or the legal guardians gave the consent on behalf of the subjects under the legal age.

Statistical analyses

The Kolmogorov-Smirnov and Shapiro tests were conducted to verify the normality of the data. Different parametric or non-parametric tests [such as the t-test, Mann-Whitney U test, analysis of variance (ANOVA), chi-square test, and Kruskal-Wallis test] were applied depending on the normal distribution of data. The reliability/consistency was determined with the aid of calculating Cronbach's alpha coefficient. The reliability was considered excellent: if coefficient >0.9; good: 0.8-0.9; acceptable: 0.7-0.8; adequate: 0.6-0.7; poor: 0.5-0.6; unacceptable: <0.5. Pearson's coefficient (r) was computed as reported by Hinkle., *et al*. [36]. The statistical package for social sciences (SPSS for Windows, IBM Corp., and Armonk, NY, USA) version 13 was implemented to perform the statistical analyses of the entire data.

Results

Demographic features of the study participants

A total of 150 (N) Muslim patients having type-2 diabetes mellitus (T2DM) took voluntary participation in this study and completed the questionnaire with valid responses. The patients had a mean age of 52.08 ± 11.11 years. Proportion of females (n = 97; 64.67%) was more than the males (n = 53; 35.33%). All the patients fasted for 27.85 ± 2.31 days. Table 1 carries the participants' additional demographic details.

Parameter	Value
Age (years)	52.08 ± 11.11
Gender (number, %)	
Male	53 (35.33%)
Female	97 (64.67%)
Marital status (number, %)	
Married	84 (66%)
Not married	66 (44%)
Educational level (number, %)	
Secondary	95 (63.33%)
High School	55 (36.67%)
Disease type (number, %)	
Diabetes	81 (67.2%)
Diabetes and complications	16 (6.0%)
Diabetes with other chronic disorders	53 (3.0%)
Employment status (number, %)	
Not working/unemployed	37 (%)
Working	81 (%)
Retired	32 (%)
Number of fasting days	27.85 ± 2.31

Table 1: Demographic features of the recruited patient sample (N = 150).

Descriptive statistics and Cronbach's alpha coefficient for the questionnaire

The items or the questions in the questionnaire designed to assess the Ramadan fasting beliefs along with other religious beliefs and practices have been provided as subscales in table 2.

Descriptive statistics with skewness and kurtosis values for each item have been shown in table 3. Under the 'Ramadan fasting beliefs and practice subscale', the most patients (mean value = 3.960, SD = 1.438) agreed with the item 20 ("I do not accept that a person breaks the fast in front of me while I am still fasting"), followed by mean of 3.458 (SD = 1.153) and 3.323 (SD = 1.323) number of patients agreeing to the items 8 ("I think that whoever dies while fasting, even though it would not be permissible to fast for him/her, is in the order of the martyrs with God") and 5 ("I consider fasting in Ramadan despite my illness an increase in closeness to God") respectively. While under the 'Religious beliefs and practices' sub-scale, maximum patients (5.021 and 4.627 respectively) agreed to items 39 ("I think the problems we are experiencing in this age are because of the distance from Islam"), 34 ("I believe that faith positively affects both my mental and physical health"), and 40 ("I believe that Islam is the path of salvation and eternal happiness").

Serial Number	Items
Ramadan fasting beliefs and practice sub-scale	
1	I think that Ramadan fasting is a cure for my illness, even though my doctor and my spiritual guide have advised me not to fast.
2	I am embarrassed when I have to break the fast of Ramadan in front of people.
3	I do not openly break the fast of Ramadan.
4	I am afraid that I will have problems with others if I don't fast during the month of Ramadan.
5	I consider fasting in Ramadan despite my illness an increase in closeness to God.
6	I don't think that the first obligation to fast is to carefully listen to doctor's advice.
7	I feel that I can fast because my illness and/or my age have not reached yet an advanced stage.
8	I think that whoever dies while fasting, even though it would not be permissible to fast for him/her (for example, due to sickness), is in the order of the martyrs with God.
9	I think that I can openly break the Ramadan fast only with my family and people with whom I have an intimate relationship.
10	I am afraid that I will be at risk of dying during the Ramadan fasting.
11	I am at risk of complications or of death because of fasting as I do not adhere to the doctor's advice.
12	I accept to increase the symptoms of the disease during fasting on the month of Ramadan.
13	I believe that preserving religion is more important than self-preservation.
14	I think the doctor's advice not to fast is not binding.
15	I consider the position of medicine which allows me not to fast contrary to the *Shariah* (Islamic law).
16	I would feel guilty if I would follow the *shuyukh*, *fuqahā*, *a'immah* (spiritual guides/leaders)'s advice, who have permitted me not to fast.
17	I feel bad when I break the fast.
18	When I break the fast, I feel that others are looking at me with contempt.
19	I think that the permission of the (spiritual guides/leaders) for me not to fast during the month of Ramadan is not obligatory.
20	I do not accept that a person breaks the fast in front of me while I am still fasting.
Religious beliefs and practices sub-scale	
21	I try to pray all my prayers in the mosque.
22	I am committed to praising and making supplications, after every prayer.
23	I am committed to reading the *Qur'an* on a daily basis.
24	I abide by honesty and integrity in dealing with all people.

25	I consider that Islam is the true religion that should be observed in all its teachings and precepts.
26	I consider my sickness to be from God in order to strengthen my faith.
27	I think that God is the healer alone and there is no need for medicine.
28	I think that my life and my health are entirely in God's hands and are not influenced whether I take or not drugs.
29	I believe that the *Qur'an* will heal all physical diseases
30	I believe that the righteous are engaged in reciting the *Qur'an* and doing supplication, without having the need of taking medication
31	I believe that it is faith in Islam that relieves my suffering from disease.
32	I think that Islam is the main reason I do not believe in suicide.
33	When the pain of the disease is overwhelming, there is nothing more powerful and effective than the prayer.
34	I believe that faith positively affects both my mental and physical health.
35	I can only get sick or worse with medication.
36	I am worried when God does not respond to my call for healing.
37	When I have to face a problem in my life I think it is a penalty for a bad deed I have committed.
38	I consider the teachings and precepts of Islam to be inspiring and guiding my daily behavior.
39	I think the problems we are experiencing in this age are because of the distance from Islam
40	I believe that Islam is the path of salvation and eternal happiness

Table 2: The Ramadan fasting beliefs and religious beliefs and practice subscale items of the questionnaire.

Item	Mean	Standard Deviation	Skewness		Kurtosis	
			Statistics	Standard Error	Statistics	Standard Error
1	2.408	1.401	0.510	0.172	-1.159	0.341
2	3.005	1.512	0.079	0.172	-1.459	0.341
3	3.189	1.471	-0.189	0.172	-1.364	0.341
4	2.960	1.236	-0.052	0.169	-0.902	0.341
5	3.323	1.323	-0.287	0.172	-1.035	0.341
6	3.015	1.290	-0.268	0.172	-0.965	0.341
7	3.045	1.369	-0.200	0.172	-1.171	0.341
8	3.458	1.153	-0.689	0.172	-0.486	0.341
9	3.229	1.333	-0.427	0.172	0.862	0.340
10	2.940	1.160	0.098	0.172	-0.739	0.340
11	2.756	1.275	0.072	0.172	-1.085	0.340
12	2.761	1.205	0.020	0.172	-0.896	0.341
13	3.020	1.177	-0.096	0.172	-1.058	0.341
14	2.985	1.447	-0.004	0.172	-1.300	0.341
15	3.110	1.431	-0.029	0.172	-1.387	0.341
16	2.990	1.490	0.036	0.172	-1.401	0.341
17	3.144	1.343	-0.354	0.172	-1.035	0.339
18	3.124	1.449	-0.229	0.172	-1.324	0.341
19	2.896	1.369	-0.152	0.172	-1.256	0.341
20	3.960	1.438	-0.133	0.171	-1.411	0.341
21	3.171	1.181	-0.225	0.172	-0.454	0.341
22	3.547	1.034	-0.128	0.172	-0.480	0.341
23	3.587	0.956	-0.408	0.172	0.237	0.341
24	3.821	0.817	0.340	0.172	0.012	0.341
25	3.995	0.935	-0.731	0.172	0.377	0.341
26	3.965	0.897	-0.772	0.170	0.786	0.341
27	3.672	1.073	-0.564	0.172	-0.235	0.340
28	3.725	1.169	-0.669	0.172	-0.241	0.342
29	3.826	1.084	-1.005	0.172	0.755	0.341
30	3.537	1.109	-0.673	0.172	0.060	0.341
31	3.522	1.143	-0.781	0.172	0.109	0.341
32	3.692	1.079	0.665	0.172	-0.249	0.341
33	3.791	1.166	-0.750	0.172	0.075	0.341
34	4.627	1.125	0.423	0.172	-0.335	0.341
35	3.328	1.154	-0.491	0.172	-0.437	0.341
36	3.313	1.177	-0.501	0.172	-0.443	0.340
37	3.323	1.217	-0.508	0.172	-0.554	0.341
38	3.721	1.180	-0.735	0.172	-0.193	0.341
39	5.021	1.049	-1.065	0.172	0.682	0.341
40	4.110	1.085	1.386	0.172	1.112	0.341

Table 3: Descriptive statistics with skewness and kurtosis values for all the items in the questionnaire.

The Cronbach's alpha coefficient (α) for the overall items in the questionnaire was found to be 0.91 indicating the reliability to be excellent (Table 4).

The findings of the multivariate analyses suggested that after adjusting for confounders, the number of fasting days were significantly influenced by different variables such as the occupation [β standardized coefficient (β) = 0.060; T = 0.843; P = 0.000], age (β standardized coefficient = -0.142; T = -1.658; P = 0.001), educational level (β standardized coefficient = 0.045; T = 0.637; P = 0.002), fasting and religious beliefs and practices (β standardized coefficient = -0.199; T = -2.917; P = 0.004), and diabetes complications and comorbidities (β standardized coefficient = 0.194; T = -2.775; P = 0.006) (Table 5).

Item	Scale mean if an item deleted	Scale variance if item deleted	Corrected item-total correlation	Squared multiple correlation	Cronbach's alpha if item deleted
1	131.310	493.300	0.627	0.724	0.906
2	130.720	487.147	0.670	0.803	0.912
3	130.545	497.727	0.524	0.688	0.906
4	130.770	506.238	0.476	0.595	0.908
5	131.400	496.231	0.614	0.715	0.905
6	130.720	512.806	0.340	0.663	0.909
7	127.685	457.654	0.568	0.743	0.906
8	130.265	507.824	0.439	0.689	0.908
9	130.505	503.980	0.477	0.552	0.907
10	130.790	529.182	0.070	0.594	0.919
11	130.970	545.919	-0.223	0.448	0.916
12	130.960	523.164	0.175	0.481	0.911
13	130.695	505.650	0.472	0.529	0.907
14	131.740	498.274	0.523	0.635	0.906
15	130.620	490.116	0.663	0.780	0.904
16	130.730	488.681	0.657	0.702	0.904
17	130.580	496.948	0.591	0.695	0.906
18	131.605	497.306	0.538	0.590	0.911
19	130.825	449.030	0.545	0.672	0.911
20	129.770	505.957	0.405	0.545	0.908
21	131.535	498.642	0.647	0.766	0.912
22	130.180	511.877	0.455	0.624	0.908
23	130.135	513.303	0.462	0.973	0.908
24	129.900	517.668	0.428	0.529	0.908
25	129.735	511.040	0.529	0.600	0.912
26	129.755	514.387	0.469	0.632	0.908
27	130.055	512.314	0.427	0.677	0.908
28	130.000	510.221	0.429	0.646	0.908
29	129.895	518.265	0.300	0.480	0.911
30	130.190	514.054	0.376	0.633	0.908
31	130.100	515.849	0.329	0.533	0.909
32	133.035	516.305	0.342	0.569	0.909
33	129.935	514.322	0.388	0.547	0.908
34	130.101	515.089	0.351	0.395	0.909
35	130.395	519.486	0.255	0.484	0.910
36	129.415	525.128	0.143	0.563	0.911
37	130.390	517.124	0.285	0.488	0.910
38	129.011	511.105	0.408	0.626	0.908
39	129.695	512.022	0.449	0.591	0.908
40	129.610	507.861	0.451	0.472	0.912

Table 4: Reliability statistics with Cronbach's alpha coefficient (α) for each item of the questionnaire.

Parameter	Non-standardized coefficients		Standardized coefficients	T	P-value
	B coefficient (β)	Standard Deviation	Beta coefficient (β)		
Constant	39.341	3.082	-	8.865	0.000
Gender	1.319	1.183	0.076	1.115	0.266
Age	-0.077	0.046	-0.142	-1.658	0.001
Family status	1.928	1.494	0.105	1.290	0.198
Educational level	1.049	1.646	0.045	0.637	0.002
Occupation	2.001	1.324	0.060	0.843	0.000
Diabetes complications and co-morbidities	-3.505	1.263	0.194	-2.775	0.006
Fasting and religious beliefs and practices	-0.061	0.025	-0.199	-2.917	0.004

Table 5: Multivariate regression analyses of different parameters studied.

Discussion

The religious and lifestyle practices to be fulfilled by Muslims or what is recognized as the 'five pillars of Islam' are shahadah (Oath for declaring one's faith in Islam), salat (five times prayer), zakat (giving alms to the poor), sawm (Ramadan fasting or self-purification), and Hajj (pilgrimage to Makkah). Muslims worldwide celebrate Ramadan, as a time of fasting, spiritual deliberation, worship, self-improvement, and enriches the sense of community [37,38]. Muslims have a belief that Ramadan fasting allows them to practice self-control, discipline, empathy towards the less fortunate, instill compassion for the poor and needy people, and obtain large spiritual rewards (thawab) from Allah [39-41]. Therefore, many Muslims despite having diabetes and religiously being exempted from fasting still assert to do so and also alter their medication during Ramadan, even against medical recommendations [27,42-44]. A questionnaire-based survey study carried out in Pakistan showed that 72.2% of the study population of 453 diabetic patients did fasting for an average of 25 days in the month of Ramadan [45]. Recently, another high-quality, global, epidemiological research (the CREED study) on the treatment and outcomes of a total of 3,250 T2DM patients revealed that 94% of such patients fasted for an average of 27 days [12]. As reported by Ba-Essa., *et al.* [46], more than 80% of T2DM patients were classified as a high-risk group by the American Diabetes Association observed fasting during Ramadan.

Our present study was carried out to understand the determinants or more specifically the Ramadan and Religious beliefs and

practices that compel the Muslim diabetic population to observe Ramadan fasting. In this survey-based study, 150 Muslim T2DM patients were found to fast for an average of 27.85 ± 2.31 days during Ramadan. However, the number of fasting days was significantly influenced by employment status (P = 0.000), age (P = 0.001), educational level (P = 0.002), fasting and religious beliefs and practices (P = 0.004), and diabetes complications and comorbidities (P = 0.006) [47].

Moreover, now the precautionary measures during the COVID-19 pandemic have made Ramadan very different from the previous years. Many studies have suggested, in healthy individuals, Ramadan fasting mimics intermittent fasting and augments immunity against infections due to reduction in IL-1β, IL-6, and TNF-α [17,20]. and an increase in immunoglobulin-like IgA [48]. However, this annual practice of fasting poses potentially dangerous consequences, especially in a patient cohort with diabetes mellitus. The data from a substantial study "Epidemiology of Diabetes and Ramadan" (EPIDIAR), carried out on a sample of 12,243 diabetic patients in 13 Islamic countries demonstrated that around 79% of T2DM patients who fasted in the time of Ramadan exhibited an increase in diabetic ketoacidosis, hypo/hyperglycemia, thrombosis, and dehydration, resulting in hospitalization [9]. A similar high incidence of hypoglycemia was observed among 16.8% of T2DM patients on insulin treatment and 5.3% of T2DM patients on oral anti-diabetic medication during Ramadan fasting [27]. Benghazi Diabetes and Endocrine Centre (BDEC) study reported hyperglycemia among 10.7% of patients suffering from T2DM who fasted during Ramadan [49]. Moreover, according to the findings from two studies, it is difficult for T1DM patients to manage their sugar levels or medical condition during Ramadan, despite the guidance from the HCPs [6,50].

An increased risk of complications arising amongst the diabetic cohort during the period of Ramadan necessitated the development of International recommendations to make the doctors and patients prepared for fasting during Ramadan. In 2017, with the help from the Mufti (an Islamic jurist qualified to issue a nonbinding opinion or *fatwa* on a point of Islamic law or *sharia*) of Egypt, extensive International guidelines through the collaboration between IDF and DAR (International Diabetes Federation and Diabetes and Ramadan International Alliance) were prepared and updated in 2021 to provide HCPs with all the pragmatic knowledge and skills required for managing diabetic patients, fasting during Ramadan [2,51]. In addition, numerous reviews have been published that discuss the advantages of risk stratification, organized Ramadan-centered education on religious exemptions, glucose monitoring, dietary and lifestyle modifications for diabetic Muslims, regulated physical activity, use of diabetes medications, medication adjustment, and fasting during Ramadan [6,43,52-56]. However, religion is a deeply personal matter, and its impact on illness is difficult to measure [57,58], therefore determining whether to fast or not to fast varies from person to person.

Conclusions

Our questionnaire-based study investigating the religious and Ramadan fasting beliefs and practices prevalent amongst Muslims proved to be an important tool in determining the driving factors influencing the decision of diabetic people to fast during Ramadan. Large proportions of T1DM and T2DM patients urging to keep such fasts pose a great challenge for the HCPs. To ensure safety during fasting days, physicians should provide tailored information regarding the diet and usage of medications to diabetic patients based on their religious views and experiences. Religious authorities should also encourage medically safe fasting practices during Ramadan.

Conflicts of Interest and Source of Funding

The authors have disclosed that they have no significant relationships with, or financial interest in, any commercial companies pertaining to this article.

Contribution of Authors

Both the authors contributed equally to the study.

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