

## Knowledge, attitude and perceptions of Muslim cancer patients regarding cancer treatment during Ramadan: Results from a tertiary care hospital Karachi

Afshan Asghar Rasheed,<sup>1</sup> Yasmin Abdul Rashid,<sup>2</sup> Farah Tahir Pirzada,<sup>3</sup> Fawad Haroon,<sup>4</sup> Adnan Abdul Jabbar,<sup>5</sup> Ahmed Rahim<sup>6</sup>

### Abstract

**Objective:** To assess the knowledge and attitude of Muslim cancer patients regarding cancer treatment during Ramadan.

**Methods:** This cross-sectional study was conducted at the Aga Khan University Hospital, Karachi, from July to August 2015, and comprised cancer patients. Adult Muslim cancer patients receiving active oncological treatment or on surveillance were included. Patients on only supportive treatment were excluded. SPSS 19 was used for data analysis.

**Results:** Of the 265 patients, 87(32.8%) were males and 178(67.2%) were females. The overall mean age was 49±13.87 years. Besides, 184(70.9%) patients belonged to the middle class. Breast cancer was the most common cancer 106(40.6%). Overall, 153(57.9%) patients had stage II disease. Further, 201(80%) patients had 0-1 performance status. Moreover, 180(72%) patients were receiving different forms of chemotherapeutic agents. It was found that 113(54.3%) patients sought advice regarding fasting. Most of the patients who observed fast, i.e. 214(81%), had an early stage disease and 19(7.1%) were on hormonal therapy. Patients who did not fast mostly attributed this to fatigue 69(26.3%).

**Conclusion:** Only half of the patients sought advice on fasting and those having early disease more frequently observed fast.

**Keywords:** Ramadan, Chemotherapy, Fasting, Perceptions. (JPMA 67: 1144; 2017)

### Introduction

Ramadan is the ninth lunar month of the Muslim calendar, when it is compulsory for all healthy adult Muslims to withhold from food and drink from dawn to sunset daily.<sup>1</sup> Islam gives provision of not fasting for individuals for whom it may cause harm, for example those suffering from acute or chronic diseases.<sup>2</sup> Despite the leniency in Islamic rules, some cancer patients wish to follow their religious tradition of fasting during Ramadan.<sup>3</sup> The issue of fasting during Ramadan has great importance for Muslim cancer patients, often putting them in a stressful situation. At times they fail to consult health care practitioners, family and friends or religious scholars, regarding fasting and feel guilty if they do not fast.<sup>4</sup> In Egypt, 46% cancer patients consulted the doctor about fasting, while only 20.8% of the Turkish Muslim patient population sought a physician's advice regarding fasting.<sup>4</sup>

Cancer is a complex disease having a multi-faceted aetiology, including genetic, lifestyle and environmental factors.<sup>1</sup> European Prospective Investigation into Cancer

and Nutrition (EPIC) study observed significant association between some malignancies and dietary habits.<sup>2</sup> After a short-term, controlled starvation for 48 hours, cancer cells were affected up to 1,000 times more than normal cells from the effects of chemotherapy and oxidative stress, a phenomenon termed as Differential Stress Resistance.<sup>4</sup> Islam gives provision for not fasting, if this would be harmful to person in acute or chronic disease.<sup>5</sup> However, some cancer patients still wish to follow their religious tradition of fasting during Ramadan.<sup>6</sup> In a study by Raffaghello et al., 10 patients who fasted in combination with chemotherapy reported that fasting caused a reduction in side effects of therapy.<sup>3</sup> In one study by Fernando M, Safdie et al., fasting was safely repeated in multiple cycles for up to 180 hours prior and/or following chemotherapy.<sup>4</sup> Complaints reported during fasting were dizziness, hunger and headache, which did not interfere with daily routine activities. Weight lost was also regained in most of the patients.<sup>4</sup> Therefore, perceived adverse effects of chemotherapy on cancer patients who were fasting were short-lived.

Pakistan is the second-largest Muslim nation in the world and a member of the South Asian Association for Regional Cooperation(SAARC).<sup>7</sup> The country's population was 173 million in 2008,<sup>8</sup> of whom 97 percent people

.....  
<sup>1</sup>Sindh Institute of Urology and Transplantation, <sup>2,4-6</sup>Aga Khan University Hospital, <sup>3</sup>Dow Medical College, Karachi.

**Correspondence:** Afshan Asghar Rasheed. Email: drafshanrasheed@yahoo.com

were Muslim.<sup>9</sup> Noronha et al. reported 150,000 new cancer cases each year in Pakistan.<sup>10</sup> Many Muslims with chronic illness like cancer practise fasting during the month of Ramadan.<sup>11</sup> There is sparse data to select cancer patients who can tolerate fasting.<sup>6</sup> To the best of our knowledge, there is no study conducted on cancer patients to assess their knowledge and practices regarding fasting. It is believed that the masses are aware of the generalised benefits of fasting, but the precise benefits of controlled starvation with cancer treatment are not well known. The current study was planned to explore the knowledge, attitude and perceptions of Pakistani Muslim cancer patients about cancer treatment during Ramadan.

### Patients and Methods

This cross-sectional study was conducted at the clinics of medical oncology unit of the Aga Khan University Hospital (AKUH), Karachi, from July to August 2015 coinciding with the month of Ramadan, and comprised cancer patients.

Adult Muslim cancer patients receiving active oncological treatment or on surveillance were included. Patients on only supportive treatment were excluded.

Fasting was defined according to Islamic rules, i.e. abstaining from drinking, eating and smoking from dawn to sunset. Eastern Cooperative Oncology Group (ECOG) Performance status was defined according to the World Health Organisation's (WHO) classification.<sup>12</sup> According to WHO, ECOG performance status is divided into 5 groups. ECOG-0 means fully active. ECOG-1 means restricted in physically strenuous activity. ECOG 2 is ambulatory and capable to do carry out all self care but unable to carry out any work, up and about more than 50% of day time. ECOG 3 defined as bed bound more than 50 % of waking hours. ECOG 4 is totally confined to bed, unable to do own care. ECOG 5 means death

The sample size was calculated using WHO software for sample size calculation.<sup>13</sup> A sample size of 267 was required to measure fasting among cancer patients based on expected prevalence of 50% at 95% confidence level with 6% margin of error. Expected proportion of 50% was taken to have the maximum sample size.

Participants were recruited consecutively through non-probability sampling. Data was collected by authors using a structured questionnaire which was adopted from the study by Faukh Tas et al.<sup>14,15</sup> The questionnaire was translated into native language, i.e. Urdu. All the questionnaires were first tested on a pilot of 10

patients from the oncology clinics at the AKUH. After the pilot, a similar technique was used to collect data from the study population. The questionnaire consisted of questions including demographics, comorbidities, performance status and date of diagnosis, type and stage of cancer, current oncologic treatment and intent of treatment. The second part related to perceptions of patients regarding fasting during Ramadan. Patients were asked about fasting status at the time of interview, history of side effects of oncologic treatment before Ramadan, whom they consulted for fasting and the reasons for not fasting. We divided the socioeconomic group into upper class (people earning more than Rs40,000 per month), middle class (earning Rs20,000-40,000 per month) and lower class (earning less than Rs20,000 per month).<sup>16</sup> Patients were labelled as literate if they had matriculation or equivalent degree.

Data entry was conducted by two separate groups of individuals to minimise errors. Data was analysed using SPSS 19. Continuous data, such as patients' age, was presented as mean  $\pm$  standard deviation (SD). Categorical values were presented as frequencies. For comparison of sub-groups, chi-square test was used for categorical values. The independent t-test was applied for comparing continuous variables. Comparison was made on the basis of gender, age and type of cancer treatment being received and the association of these factors with the patient's perspective towards fasting in Ramadan.  $P < 0.05$  was considered significant for all statistical analyses.

The study was approved by the institutional ethics review committee, and informed consent was taken from all the participants. Patients were assured that refusal to participate in the study would not lead to loss of benefit at the respective hospital of which patients are otherwise entitled to.

### Results

Of the 270 participants who gave consent and were interviewed, 265(98.15%) were included. Of them, 87(32.8%) patients were males and 178(67.2%) were females. The overall mean age was  $49 \pm 13.2$  years (range: 18 to 80 years). Moreover, 188(70.9%) participants belonged to the middle class, 39(15%) to the lower class and 36(13.9%) to the upper class. Among female patients, 105(59%) were housewives. Out of the total population, 31(11.7%) were businessmen, 12(11.7%) physicians, 6(2.3%) engineers, 3(1.5%) retired and 47(18%) belonged to other professions. Also, 237(89.5%) participants were married, 2(0.8%) were separated, and

**Table-1:** Demographics of Muslim cancer patients.

Variable		Frequency (100%) n-265
Age	Mean(SD)	49.5+/- 13.8
	<50 years	133(50.2%)
	>50 years	132(49.8%)
Gender	Male	88(33%)
	Female	178(66.9%)
Education	Literate	228(86%)
	Illiterate.	37(14%)
Occupation	Housewife	157 (59%)
	Business	31 (11.7%)
	Doctor	12 (4.5%)
	Engineer	6 (2.3%)
	Others	59 (22.2%)
Performance Status	ECOG I	212 (79.7%)
	ECOG II	54 (20.3%)
Type of cancer	Breast	108 (40.6%)
	GI	37 (13.9%)
	Lymphoma	39 (14.7%)
	Buccal Mucosa	26 (9.8%)
	Others	56 (21%)
Current Oncologic treatment (n-215,-81%)	Hormonal therapy	16(6%)
	Chemotherapy	186(70%)
	Others	8 (5%)
		55(20 % ) were not receiving any treatment
Oral –Chemo/hormonal (n-50, 19%)	Capecitabine	10(3.8%)
	Tamoxifen/Femara	18(6.8%)
	Others	24(9%)
Socioeconomic condition	Upper class	37 (13.9%)
	Middle class	188 (70.9%)
	Lower class	40 (15%)

ECOG: Eastern Cooperative Oncology Group

GI: Gastrointestinal

SD: Standard Deviation.

22(8.6%) were single (Table-1).

Furthermore, 167(63.2%) patients had no associated comorbidities, 47(18%) had hypertension and 21(8.3%) had diabetes mellitus. The most common malignancy was breast cancer 106(40.6%), followed by gastrointestinal malignancies 36(13.9%). Besides, 153(57.9%) participants had stage II disease at the time of the interview. The number of patients receiving different forms of chemotherapy was 180(72%). The most common intravenous chemotherapy was doxorubicin and cyclophosphamide in 30(16.5%) patients, followed by carboplatin and paclitaxel in 19(10.5%) patients, whereas 35(19.4%) patients were receiving other forms of chemotherapy. Also, 42(23.8%) patients were cured on Single-agent chemotherapy.

**Table-2:** Attitude and perceptions of Muslim cancer patients during Ramadan.

Variable	N-265(100%)
<b>Did you seek advice for fasting</b>	
Yes	144(54.3%)
No	121(45.6%)
<b>If you did seek advice, suggestion of respective advisors</b>	
Discouraged	73(27.4%)
Encouraged	24(9%)
Equivocal	32(12%)
<b>If fasting then how many days would like to fast during Ramadan (n-72, 27%)</b>	
All days	26(9.8%)
Most of the days	46 (17.3%)
<b>Not fasting secondary to</b>	
Allowed in Islam	81 (30.6%)
Nausea/vomiting/diarrhoea	54(20.3%)
Others	130(49%)
<b>How do you feel if not fasting</b>	
Guilty	29(10.9%)
Sad	59(22.3%)
At piece	78 (66.9%)
<b>If fasting, how do you feel</b>	
Content	213(80.1%)
Stress	36(13.5%)
No effect	17(6.4%)
<b>What do you think, with fasting side effects of chemotherapy</b>	
Aggravate	135 (50.9%)
Alleviate	32 (12.1%)
No effect	98(36.9%)
<b>If fasting attitude would be</b>	
Positive	196(73.7%)
Negative	29(10.9%)
No effect	41(15.4%)

Oral chemotherapy was taken by 35(19.6%) patients. Hormonal therapy encompassed 19(7.1%) of the study participants. The intent of treatment was found to be curative in 177(66.9%) patients.

Moreover, 144(54.3%) patients sought advice regarding fasting; 50(18.8%) consulted a physician, 66(25%) discussed with their family members and 20(7.5%) discussed with their physician and family both. Besides, 8(3%) patients consulted their Imam (religious scholar). Out of the population of respective advisors, only 24(9%) had encouraged fasting and 72(27%) advised against it. Most of the patients followed their respective advisor's suggestions. Furthermore, 72(27%) patients were fasting at the time of interview. Among them, 26(9.8%) wished to fast throughout Ramadan. The 215(81%) patients who observed fast at the time of interview had early stage disease, i.e. stage I or II.

Patients who did not fast mostly attributed this to fatigue

**Table-3:** Comparison of fasting vs. non fasting patients.

Characteristic	Fasting at the time of interview		Chi-square	P-value*
	Yes	No		
<b>Education</b>				
Literate	67(25%)	161(61%)	1.019	0.601
Illiterate	7(2.6%)	30(11.3%)		
<b>Age</b>				
≤50 years	41(15%)	94(35%)	12.5	0.289
>50 years	7(2.6%)	97(37%)		
<b>Gender</b>				
Male	16(6%)	71(27%)	5.7	0.021
Female	58 (22%)	120(45%)		
<b>Socioeconomics</b>				
Upper	12(4.5%)	25(9.4%)	0.81	0.66
Middle	53(20%)	131(49.4%)		
Lower	9(3.4%)	35(13.2%)		
<b>Occupation</b>				
Housewife	51(19%)	103(39%)	12.84	0.045
Doctor/Engineer	8 (3%)	10 (4%)		
Others	15(6%)	74 (28%)		
<b>Type of cancer</b>				
Breast	48(18%)	58(22%)	29.04	0.001
Lymphoma	11(4%)	27(10%)		
Others	15(6%)	106(40%)		
<b>Current oncologic treatment</b>				
Hormonal	44(17%)	4 (1%)	11.7	0.02
Chemo/targeted	31(12%)	152(57%)		
Others	9(3%)	35 (13%)		

70(26.3%). Besides, 62(23.3%) patients believed that being sick did not mandate them to fast. Also, 27(10.2%) and 15(5.3%) patients cited nausea and vomiting, respectively, to be a concerning side effect that would interfere with fasting. Only 26(9%) patients skipped fasting due to the common belief that intravenous chemotherapy would break the fast and 20(7.6%) attributed it to diarrhoea and pain as the reason for not fasting.

Among other perceptions, 215(81%) patients felt comfortable in telling others that they were not fasting; 192(72%) patients who did not observe fast confessed that they would have been more satisfied if they observed fast; 160(60.5%) patients gave the impression that fasting would have interfered with their cancer treatment; 232(87.6%) patients expressed the desire that if they were given a choice, they would have continued treatment with fasting; 240(94.4%) believed that fasting would have spiritually strengthened them and hastened the healing if they would have observed fast (Table-2).

In the subgroup analysis for perceptions of patients, statistically significant difference was observed between some variables. Patients who sought advice about fasting

strictly followed their advisor's recommendations (p=0.005). Subjects who did not fast believed that the side effects of chemotherapy would have worsened during fasting (p=0.001). The most common reason to skip fast was vomiting and fatigue (p=0.003). Non-fasting patients felt guilty in comparison to patients who did fast (p=0.014). Patients expressed their faith that fasting can hasten their healing (p=0.05). We did not find any difference between people who sought advice and did fast compared to non-fasting patients who did not consult anyone regarding this (p=0.036). Other questions related to perceptions, i.e. whether patients were comfortable in telling others about not fasting, continuation of treatment during fasting and whether fasting could interfere with oncological treatment, did not show any notable difference statistically (p=0.23).

A comparison of fasting and non-fasting patients at the time of interview on the basis of their demographics, perceptions and attitude was done. We found statistically significant differences in fasting between the two genders (p=0.016). Housewives, females with breast malignancy, early stage cancer patients and those having ECOG performance status 0-1 were also found to be in a better

state to fast in comparison to other kinds of occupations, cancers and advanced stage disease ( $p < 0.05$ ). However, variables such as education, economic status, co-morbid conditions and age group did not show a significant difference ( $p = 0.36$ ). We did not find any difference based on ethnicity. On the other hand, patients on oral hormonal therapy showed a significant difference with fasting than the ones receiving intravenous or oral chemotherapy ( $p = 0.03$ ) (Table-3).

## Discussion

Fasting is one of the five pillars of Islam; hence it is a distinctive spiritual characteristic of this religion. Therefore, many Muslim patients, as per their religious spirit, insist to observe fast even though Islam gives them liberality from fasting because of their ill health.<sup>17,18</sup> Muslim cancer patients are amongst those who want to observe fast during Ramadan.<sup>19</sup> In medical literature, there is sparse data about fasting during active oncological treatment and no published guidelines are available.

In the context of medical element, we assessed the knowledge, attitude and perceptions of our Muslim cancer patients about fasting during Ramadan (July). As per our literature search, we found studies postulating the positive effects of fasting on cancer treatment.<sup>20</sup> Raffaghello L. et al. highlighted the fact that fasting effectively improved burden of cancer by creating fast-induced stress resistance for malignant cells.<sup>21</sup> Safdie and Bradhorst in their study also brainchild the phenomenon of starvation to induce death of cancer cells.<sup>22</sup> Moreover, a case report by M. Safdie and Tanya Dorff endorsed the fact that fasting alleviates the side effects of chemotherapy in a cancer patients.<sup>4</sup>

Among the surveyed group, the majority (60%) of the population did not fast due to exceptionally high hot weather conditions i.e.  $> 40^{\circ}\text{C}$ . This heat wave shadowed the holy month of year 2015, affecting the health of the normal healthy population and thus being a cause for sickness and extreme exhaustion. In our study, females (66.7%) were the dominant gender, with breast cancer (40.6%) being the most common malignancy. Among patients who practised fast, 80% were females and 79% amongst them were on hormonal treatment. There was a significant difference between female gender and breast cancer during fasting ( $p < 0.05$ ). It might be secondary to the fact that most females were housewives, had early stage disease and were taking hormonal therapy that can be taken at any time in non-fasting hours. These results were consistent with the findings observed in a Turkish study, in which patients on hormonal therapy with

urogenital cancer practised fast comparatively more than other malignancies.<sup>15</sup> In case of breast carcinoma, we noticed patients having good performance status till advanced stage of their disease in comparison to other malignancies and because of good physical condition they managed to tolerate fast while receiving chemotherapy. In Groot et al's. pilot study, 7 out of 13 breast carcinoma patients tolerated chemotherapy well.<sup>23</sup> In our study, 14 out of 72 (19.4%) patients receiving intravenous chemotherapy did fast, among them 12(6%) had early stage breast carcinoma and were receiving doxorubicin and cyclophosphamide. But there was no statistical difference between different intravenous chemotherapy regimens ( $p = 0.104$ ). It has been observed in other chronic diseases that young patients fast more than older ones because of frequent co-morbidities in the elderly.<sup>15</sup> In our study, 149(56 %) fasting patients belonged to less than 50 years of age, but this was statistically insignificant ( $p = 0.36$ ). Similarly, it was perceived that people with good performance status and non-metastatic disease would fast more than the opposite group.<sup>24</sup> In this study, patients with ECOG 0-1 and early-stage cancer observed fast more often in comparison to their counterparts (100%). All these factors, i.e. cancer stage and performance status, showed statically significant values ( $p < 0.05$ ). In Zeeneldin et al's. study, 46% patients sought advice from their oncologist.<sup>13</sup> In our study, 50(18.8%) patients discussed fasting with their physician and 8(3%) consulted Imam (religious scholar). This indicates their trust in treating physicians. Moreover, 67(25%) patients discussed the issues with their family members and physicians both for fasting, though 133(50%) were discouraged by their advisors. Patients in our study followed suggestion of their advisors. But 128(48%) did not discuss with anyone about fasting and its related issues. These patients expressed guilt for not observing fast. Among them, 191(72%) patients said they would have felt content if they had fasted. Fatigue was found to be the most common symptom in patients receiving chemotherapy and this factor affected their quality of life as well.<sup>23</sup> In our study, frequently reported symptoms for not fasting were fatigue (26%) and nausea/ vomiting (10%). It is generally believed that intravenous medicines interfere with fasting, therefore, people cannot observe fast while on any intravenous medicine. In this survey, 24(9%) patients thought that intravenous chemotherapy could nullify fast thus they avoided fasting on the days of chemotherapy. Another major contributory factor for skipping fast, which was pointed out by many patients themselves, was hot

weather. Because of unusually increased temperature in the month of Ramadan in 2015, when the study was conducted, most of the patients (60%) skipped fasting as they feared getting dehydrated and hence being more vulnerable to ongoing disease-/ treatment-related side effects. The literature search postulated a perception that if Muslim patients fasted, God would be more merciful to them, eventually hastening their spiritual healing.<sup>15</sup> Our study also supports this insight as 250(94%) patients thought that fasting would spiritually make them stronger and improve their illness, even though they were not in a fasting state.

Despite extensive literature search, we found only three studies addressing the issues of fasting of Muslim cancer patients during Ramadan. The patient-doctor relationship has not been discussed extensively. It is important for patients with any disease to have a good relationship with their treating physicians, so that they can discuss their health issues more comfortably. Similarly, perception and attitude of patients regarding fasting during Ramadan have not been studied in depth. Therefore, a proper support system for Muslim cancer patients should be built up where they can share their problems and come to solutions. Thus, better understanding can be developed in patients with mental and spiritual harmony.

### Strength of the Study

This was the first study exploring perception, attitude and issues of Muslim cancer patients regarding fasting during Ramadan. It gives us the insight of cancer patients with their relation to religion which gives us a route to make solutions for their issues. Hence, the current study tried to highlight the faded points of our system in managing the concerns of Muslim cancer patients during Ramadan.

The current study had a few limitations as well. It was conducted in a private institute where mostly upper socio-economic class can afford to visit. In our study, most common presentation was of upper middle class, therefore, we could not differentiate perception of patients according to socio-economic strata. Another difference that we observed in our study was that due to the wave of heat stroke, patients observing fast were relatively minor. Thereby, this might not be true proportion of Muslim cancer patients who usually fast in other areas of world during this month. Patients with grimmer prognosis might potentially be more likely to turn to religion, in this study most of the patients belonged to stage I/II. Therefore, we do not have good comparison of

perceptions of patients with advanced stage versus early stage cancer.

### Conclusion

Only half of the patients sought advice about fasting and those having early disease more frequently observed fast. These patients require guidance to fulfil their obligations during this month. For this patients must have a good support system. The patient-doctor relationship harbours the key position of this support system. Therefore, the treating oncologist should develop better communication with patients so that they feel more comfortable in discussing their issues. As patients need good social support while they are receiving active oncological treatment, family members and clerics should also be indulged for addressing the concerns of Muslim cancer patients more specifically during Ramadan.

**Disclaimer:** This article has not been presented or published in a conference, or published in an abstract.

**Conflict of Interest:** None.

**Source of Funding:** None.

### References

1. Sriamporn S, Parkin DM, Pisani P, Vatanasapt V, Suwanrungruang K, Kamsa-ard P, et al. A prospective study of diet, lifestyle, and genetic factors and the risk of cancer in Khon Kaen Province, northeast Thailand: description of the cohort. *Asian Pac J Cancer Prev* 2005; 6: 295-303.
2. Gonzalez CA, Riboli E. Diet and cancer prevention: Contributions from the European Prospective Investigation into Cancer and Nutrition (EPIC) study. *Eur J Cancer* 2010; 46: 2555-62.
3. Raffaghello L, Safdie F, Bianchi G, Dorff T, Fontana L, Longo VD. Fasting and differential chemotherapy protection in patients. *Cell Cycle* 2010; 9: 4474-6.
4. Safdie FM, Dorff T, Quinn D, Fontana L, Wei M, Lee C, et al. Fasting and cancer treatment in humans: A case series report. *Aging* 2009; 1: 988-1007.
5. Zeeneldin AA, Tahab FM. Fasting among Muslim cancer patients during the holy month of Ramadan. *Ann Saudi Med* 2012; 32: 243-9.
6. Tas F, Karabulut S, Ciftci R, Yildiz I, Keskin S, Kilic L, et al. The Behavior of Turkish Cancer Patients in Fasting During the Holy Month of Ramadan. *Jpn J Clin Oncol* 2014; 44: 705-10.
7. Esposito JL. *The oxford dictionary of Islam*: Oxford University Press; 2003.
8. Yusuf A. Cancer Care in Pakistan. *Jpn J Clin Oncol* 2013; 43: 771-5.
9. Leiper J, Molla A. Effects on health of fluid restriction during fasting in Ramadan. *Eur J Clin Nutr* 2003; 57: S30-8.
10. Noronha V, Tsomo U, Jamshed A, Hai M, Wategama S, Baral R, et al. A fresh look at oncology facts on south central Asia and SAARC countries. *South Asian J Cancer* 2012; 1: 1-4.
11. Blagden S, Charman S, Sharples L, Magee L, Gilligan D. Performance status score: do patients and their oncologists agree? *Br J Cancer* 2003; 89: 1022-7.
12. Oken MM, Creech RH, Tormey DC, Horton J, Davis TE, McFadden ET, et al. Toxicity And Response Criteria Of the Eastern Cooperative Oncology Group. *Am J Clin Oncol* 1982; 5 :649-55

13. Lun KC, Peter YWC, Aaron C. Sample size determination in Health Studies: Software. v 2.0 ed. Geneva: WHO.
  14. Zeeneldin AA, Taha FM. Fasting among Muslim cancer patients during the holy month of Ramadan. *Ann Saudi Med* 2012; 32: 243-9.
  15. Tas F, Karabulut S, Ciftci R, Yildiz I, Keskin S, Kilic L, et al. The behavior of Turkish cancer patients in fasting during the holy month of Ramadan. *Japan J Clin Oncol* 2014; 44: 705-10.
  16. Pakistan Bureau of Statistics. household integrated economic survey (HIES) (2013-14). Statistics Division, Government of Pakistan, Islamabad 2015. [Online] [Cited 2016 May 11]. Available from: URL: online at [www.pbs.gov.pk](http://www.pbs.gov.pk)
  17. Aziz E-SA, Sabet E. Fasting Ramadan in diabetic patients: When is fasting not advisable in a person with diabetes? *J PakMed Assoc* 2015; 65: S22-5.
  18. Ibrahim OHM. Pharmacist Role in Pharmaceutical Care during Ramadan. *Pharmacol Pharmacy* 2015; 6: 589-99.
  19. Chtourou H. Effects of Ramadan fasting on health and athletic performance. New York, NY: Omics Group International. 2015; 6-14.
  20. de Groot S, Vreeswijk MP, Welters MJ, Gravesteijn G, Boei JJ, Jochems A, et al. The effects of short-term fasting on tolerance to (neo) adjuvant chemotherapy in HER2-negative breast cancer patients: a randomized pilot study. *BMC cancer* 2015; 15: 1663-5.
  21. Raffaghello L, Safdie F, Bianchi G, Dorff T, Fontana L, Longo VD. Fasting and differential chemotherapy protection in patients. *Cell Cycle* 2010; 9: 4474-6.
  22. Safdie F, Brandhorst S, Wei M, Wang W, Lee C, Hwang S, et al. Fasting enhances the response of glioma to chemo-and radiotherapy. *PloS one* 2012; 7: e44603.
  23. Badar T, Ismail A, AlShanqeeti A. Safety and Feasibility of Muslim Fasting While Receiving Chemotherapy. *IOSR J Pharmacy* 2014; 4:15-20
  24. Bragazzi NL, Briki W, Khabbache H, Rammouz I, Chamari K, Demaj T, et al. Ramadan Fasting and Patients with Cancer: State-of-the-Art and Future Prospects. *Front Oncol* 2016; 6: 27.
-