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EFFECTS OF FASTING ALONG WITH DIFFERENT DEMOGRAPHIC FACTORS ON BLOOD PRESSURE IN UNDERGRADUATE MEDICAL STUDENTS OF A PUBLIC SECTOR MEDICAL COLLEGE IN PUNJAB PAKISTAN

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ABSTRACT

Objective: A significant proportion of fasting patients experienced a notable reduction in blood pressure, allowing them to decrease their use of antihypertensive medication while maintaining controlled blood pressure.

Study Design: Cross-sectional study.

Place and Duration of Study: Sahiwal Medical College, Sahiwal Pakistan, from Mar to Apr 2023.

Methodology: This cross-sectional study was conducted in the month of Ramadan after taking approval from institutional review board. Students of 1st year MBBS participated in the study.

Results: Association of mean arterial blood pressures with different demographic factors and Fasting Status in study participants was calculated by independent sample test. Two genders male and female, participated in this study. In males the mean blood pressure just after keeping and before breaking the fast was 92.01 and 87.31 respectively with the *p*-value of 0.153. In females the mean blood pressure just before breaking the fast was 88.06 and 82.05 respectively with the *p*-value of 0.083.

Conclusion: The study highlights the effect of fasting on the blood pressure of males, females, Passive smokers, soft drink consumers and non-consumers. The study showed the decrease in blood pressure before breaking the fast in each group.

Keywords: Blood pressure, Fasting, Undergraduate medical Students.

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INTRODUCTION

Ramadan fasting, a fundamental pillar of Islam, involves abstaining from food and drink from dawn until sunset during the ninth month of the Islamic lunar calendar. Beyond its religious significance, Ramadan fasting has garnered scientific interest due to its potential impacts on health, including cardiovascular parameters such as blood pressure.[1] Understanding how Ramadan fasting, in conjunction with various demographic factors, influences blood pressure among undergraduate medical students holds particular relevance, given their unique position as both subjects of study and future healthcare providers.[2]

The observance of Ramadan fasting entails significant alterations in dietary patterns, sleep routines, and daily activities, which can potentially affect physiological processes, including blood pressure regulation.[3] Moreover, undergraduate medical students represent a diverse demographic cohort, characterized by distinct sociocultural backgrounds, lifestyles, and health profiles.[4] Exploring how Ramadan fasting interacts with demographic variables such as age, gender, BMI, dietary habits, and stress levels can offer valuable insights into the complex dynamics underlying blood pressure fluctuations during this period of religious observance.[5]

While previous research has examined the effects of Ramadan fasting on various health parameters, including blood pressure, few studies have focused specifically on its impact within the undergraduate medical student population. This group's unique combination of academic stress, irregular schedules, and cultural diversity may influence how they experience and respond to Ramadan fasting, potentially affecting blood pressure dynamics in nuanced ways.[6]

Moreover, as future healthcare professionals, undergraduate medical students play a pivotal role in promoting community health and well-being. Understanding the physiological effects of Ramadan fasting on blood pressure in this cohort is not only academically intriguing but also clinically relevant. It can inform medical education curricula, dietary recommendations, and lifestyle counseling practices, enabling future physicians to better understand and support patients observing Ramadan while considering their cardiovascular health needs.[7]

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Undergraduate medical students represent a unique demographic group characterized by demanding academic schedules, high levels of stress, and a commitment to the pursuit of knowledge and professional development. As future healthcare providers, their dietary behaviors during Ramadan fasting not only reflect personal choices but also have broader implications for their health, well-being, and future clinical practice. Understanding how Ramadan fasting influences soft drink consumption among undergraduate medical students is therefore essential for identifying potential avenues for health promotion and disease prevention within this population.

While existing research has documented changes in dietary patterns during Ramadan fasting, including alterations in food choices, meal frequencies, and nutrient intake, limited attention has been directed towards understanding the specific effects of Ramadan fasting on soft drink consumption among undergraduate medical students. Soft drinks, characterized by their availability, affordability, and pervasive marketing, represent a significant source of added sugars and empty calories in the modern diet. Examining how Ramadan fasting influences the consumption of soft drinks within this population can provide valuable insights into the interplay between religious observance, dietary behaviors, and health outcomes.

Passive smoking, also known as secondhand smoke, poses significant health risks, including respiratory issues, cardiovascular diseases, and even cancer. Undergraduate medical students, as part of the healthcare workforce, are expected to advocate for and promote public health initiatives, including tobacco control measures. However, during Ramadan, changes in social gatherings, meal timings, and cultural practices may alter the dynamics of passive smoking exposure among this population.

While previous research has examined the effects of Ramadan fasting on various health behaviors and outcomes, including smoking cessation attempts among active smokers, limited attention has been paid to the impact on passive smoking exposure. Given the potential for increased social interactions and gatherings during Ramadan, particularly during evening meals (Iftar), it is plausible that undergraduate medical students may experience fluctuations in exposure to secondhand smoke during this period.

Moreover, undergraduate medical students represent a diverse demographic with varying cultural backgrounds, lifestyles and attitudes towards smoking. Understanding how Ramadan fasting influences passive smoking exposure within this cohort can provide insights into the broader societal and cultural determinants of tobacco use and secondhand smoke exposure, informing targeted interventions and policy initiatives aimed at reducing tobacco-related harm.

In this study, we aim to investigate the effects of Ramadan fasting, along with different demographic factors, on blood pressure among undergraduate medical students.[8] By employing robust research methodologies and statistical analyses, we seek to unravel the intricate interplay between fasting practices, demographic variables, and blood pressure fluctuations during Ramadan.[9] Our findings aspire to contribute empirically grounded knowledge that can inform medical education practices, enhance patient care strategies, and foster a deeper understanding of the intersection between religious observance, demographic characteristics, and cardiovascular health among undergraduate medical students and beyond.

METHODOLOGY

This cross-sectional study was conducted at Sahiwal Medical College, Sahiwal Pakistan, from March to April 2023 in the month of Ramazan after taking approval from institutional review board letter no. 95/IRB/SLMC/SWL dated 15.02.2023. Students of 1st year MBBS participated in the study.

Sample size was calculated according to following formula: $Sample\ Size = Z1-\propto/22p(1-p)d2$

Z1-a/2= is standard normal variant (at 5% type 1 error ($p<0.05$) it is 1.96. As in majority of studies p-values are considered significant below 0.05 hence 1.96 is used in formula.

p=Expected proportion in population based on previous studies or pilot studies= 0.207

d=Absolute error or precision = 0.06

Sample size = 105.

Undergraduate medical students of 1st year MBBS were included in the study after taking their informed consent. Students of other classes of MBBS and post graduate students were excluded from the study.

RESULTS

There were some contrasting finding in the results regarding the association of fasting status with different parameters. As far as the demographic characteristics were concerned, the results showed that majority of students were female (62.9%) while not all of them observed all fasts (40%). Though there was no

case of active smoking as it was strictly prohibited to smoke in the campus but the ratio of passive smokers were more (14.3%). As far as consumption of soft drinks was concerned, it was a striking finding that almost three forth of the students (78%) were consumers of the soft drinks. Though there was a ban on availability of the soft drinks in the campus but yet when inquired then it came to the discussion that they boought them from outside the campus. All were not involved in fasting in the Holy month of Ramadan and the frequency was also calculated for them who did the complete fast during this month and for the others too who fasted on some days and did not on others as shown in the Table-I & II.

Table-I: Demographic Variables and Fasting Status of Study Participants (n=105)

Variable	Group	n (%)
Passive Smoker	Yes	15 (14.3)
	No	90 (85.7)
Consume soft drinks once or more in a Week	Yes	78 (74.3)
	No	27 (25.7)

Table-II: Association of Mean Arterial blood pressures with different demographic factors and Fasting Status in study participants (n=105)

Variable	Groups	Mean Blood Pressure Just after keeping Fast (mm Hg)	Mean Blood Pressure Just before breaking Fast (mm Hg)	*p*-value
Gender	Male	92.01	87.31	0.153
	Female	88.06	82.05	0.083
Fasting Status	Observed Some Fasts	90.22	81.99	0.696
	Observed All Fasts	88.99	85.09	0.371
Passive Smoker	Yes	90.98	84.63	0.542
	No	89.28	83.87	0.775
Soft Drink Consumption (≥1 wks)	Yes	92.01	85.74	0.007
	No	82.33	78.92	0.059

**Calculated by independent sample t-test*

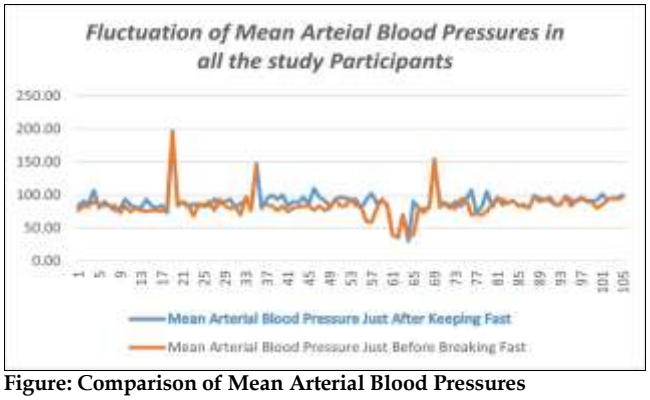

Figure: Comparison of Mean Arterial Blood Pressures

DISCUSSION

Association of Mean Arterial blood pressures with different demographic factors and Fasting Status in study participants was different. It has been noted that the percentage of male and female participants was 37.1 and 62.9, respectively.[7] The fasting status frequency observed with some fasting was 42 and a percentage of 40. Passive smokers and non-smokers participated with a frequency of 15 and 90 and a per-zcentage of 14.3 and 85.7, respectively. Soft drink consumers were 78 and 74.3, and those who were not passive smokers had a frequency of 27 and a percentage of 25.7.[8]

The effects of irregular fasting on blood pressure management and course in patients with hypertension have not been much studied in clinical research.[9] In males, the mean blood pressure just after keeping and before breaking the fast was 92.01 and 87.31, respectively, with a *p*-value of 0.153. In females, the mean blood pressure just before breaking the fast was 88.06 and 82.05, respectively, with a *p*-value of 0.083[10].

In a study conducted by Perk *et al*., it was noted that ambulatory blood pressure in hypertensive patients is not distinct before and during Ramadan. The individuals who fasted just for some days showed mean blood pressure just after keeping and before breaking off about 90.22 and 81.99, respectively, with a *p*-value of 0.696[11]. The effects of irregular fasting on urinary sodium excretion and blood pressure variability (BPV) in patients with prehypertension and recently diagnosed hypertensive disorders have not been studied[12].

Individuals with all fast showed mean blood pressure after keeping fast and before breaking the fast at 88.99mm/Hg and 85.09mm/Hg, respectively, with a *p*-value of 0.371.[13]

In a study that examined male participants' blood pressure both before and during Ramadan, it was discovered that during the end-of-day fasting state, blood pressure and heart rate readings were lower than they would be two hours after eating. In the first half of Ramadan, systolic blood pressure rose; in the second half, it returned to baseline levels (Samad *et al*) .[14]

Passive smokers showed the mean blood pressure value just after keeping the fast at 90.98 before breaking the fast at 84.63 with a *p*-value of 0.542. Non-passive smokers showed the mean blood pressure value just after keeping the fast at 89.28 and before breaking the fast at 83.87 with a *p*-value of 0.775[15].

According to a 2010 report by the surgeon general, smoking might increase blood pressure by 5-10 mm of mercury (mm Hg) just after usage. But fasting Fasting may play a significant role in adjusting smoking behaviour and regulating blood pressure.

Several mechanisms may contribute to the observed changes in blood pressure during Ramadan fasting. The alteration in meal timing and frequency disrupts the circadian rhythm of physiological processes, including blood pressure regulation. Additionally, changes in fluid and electrolyte balance, metabolic adaptations to fasting, and alterations in sympathetic nervous system activity may all play roles in blood pressure fluctuations during fasting periods. Understanding these underlying mechanisms can provide insights into the physiological adaptations occurring during Ramadan fasting and inform strategies for optimizing cardiovascular health during this period.

Soft drink consumers showed mean blood pressure just after keeping the fast at 92.01 and just before breaking the fast at 85.74 with a *p*-value of 0.00716. Non-consumers of soft drinks showed mean blood pressure just after keeping the fast at 82.33 and before breaking the fast at 78.92 with a *p*-value of 0.05917. Studies showed that drinking soft drinks is linked with increased BP, which is also raised by diet-type sodas.[18]

Several factors may contribute to the observed changes in soft drink consumption during Ramadan fasting. The altered eating schedule and emphasis on traditional foods and beverages during pre-dawn and sunset meals (Suhoor and Iftar) may influence individuals' beverage choices, favoring water, fruit juices, or herbal teas over soft drinks. Additionally, cultural and social norms surrounding Ramadan observance, including communal meals and family gatherings, may shape individuals' dietary behaviors, impacting their likelihood of consuming soft drinks during fasting and non-fasting periods. Understanding these contextual factors can inform targeted interventions aimed at promoting healthier beverage choices during Ramadan and beyond.

The observed changes in soft drink consumption patterns during Ramadan fasting have important implications for health outcomes among undergraduate medical students. Soft drinks are often high in sugar, calories, and additives, and excessive consumption has been associated with an increased risk of obesity, type 2 diabetes, cardiovascular disease, and other metabolic disorders. By reducing soft drink intake during fasting periods, individuals may inadvertently improve their overall dietary quality and mitigate the risk of adverse health outcomes associated with excessive sugar and calorie consumption.

Through this research, we aspired to contribute to a comprehensive understanding of the intersection between religious observance, cultural practices, and tobacco-related behaviors among undergraduate medical students. Ultimately, our findings informed the development of targeted interventions, educational initiatives, and public health campaigns aimed at reducing passive smoking exposure and promoting smoke-free environments within academic institutions and beyond, thus safeguarding the health and well-being of future healthcare professionals and the communities they serve.

CONCLUSION

The study highlights the effect of fasting on the blood pressure of males, females, Passive smokers, soft drink consumers and non-consumers. The study showed the changes in blood pressure before breaking and after keeping the fast in each group.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

NA & NMR: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

HP & JZ: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

ZA & AS: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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