

## Fasting Blood Glucose and Serum Creatinine Patterns in Outbound Migrant Workers: Implications for Chronic Disease Screening

Dr. Salma Sadiya<sup>1\*</sup>, Dr. Mahmuda Monowara<sup>2</sup>, Dr. Md Abu Nayem Khan<sup>3</sup>, Md. Jamil Akter<sup>4</sup>,  
Mst. Nipa Akter Lima<sup>5</sup>

<sup>1</sup>Associate Professor, Department of Biochemistry and Molecular Biology, Bangladesh Shishu Hospital and Institute, Dhaka, Bangladesh

<sup>2</sup>Associate Professor, Department of Radiology and Imaging, Bangladesh Shishu Hospital and Institute, Dhaka, Bangladesh

<sup>3</sup>Medical Officer, Muscat Medical Centre, Dhaka, Bangladesh

<sup>4</sup>Diploma in Laboratory Medicine. (SIMT) and B.Sc. in Biochemistry (Pau), Lab Incharge, Muscat Medical Centre, Dhaka, Bangladesh

<sup>5</sup>Medical Technologist, Muscat Medical Centre, Dhaka, Bangladesh

Received: 02 September 2025

Accepted: 16 September 2025

Published: 24 September 2025

**\*Corresponding Author:** Dr. Salma Sadiya, Associate Professor, Department of Biochemistry and Molecular Biology, Bangladesh Shishu Hospital and Institute, Dhaka, Bangladesh.

### Abstract

**Background:** Outbound migrant workers undergo mandatory pre-departure medical screening primarily to detect infectious diseases. However, with the rising global burden of non-communicable diseases, there is an increasing need to assess metabolic and renal health in this population. This study aimed to evaluate fasting blood glucose and serum creatinine patterns among migrant workers to inform chronic disease screening policies.

**Methods:** A cross-sectional study was conducted at the Department of Biochemistry, Muscat Medical Center, Dhaka, Bangladesh, from January to December 2024. A total of 450 migrant workers undergoing pre-departure medical evaluations were enrolled consecutively after informed consent. Fasting blood glucose and serum creatinine were measured along with routine biochemical and serological tests.

**Results:** Among the 450 participants, 84.0% had normal fasting blood glucose (<5.6 mmol/L), 12.0% had impaired fasting glucose (5.6–6.9 mmol/L), and 4.0% fell within the diabetic range ( $\geq 7.0$  mmol/L). Serum creatinine was normal in 94.0% of individuals, borderline high in 5.78%, and elevated consistent with renal impairment in 0.22%. Overall, 93.8% were declared fit for overseas employment, while 5.1% required further evaluation and 1.1% were deemed unfit due to critical abnormalities.

**Conclusion:** A notable proportion of migrant workers exhibit impaired glucose metabolism and borderline renal function abnormalities, underscoring the need to integrate metabolic and renal assessments into pre-departure medical screening. Early identification may improve health outcomes and reduce chronic disease burden among migrant populations.

**Keywords:** Migrant workers, fasting blood glucose, serum creatinine, chronic disease screening, pre-departure medical examination.

### 1. INTRODUCTION

Migration for employment is a significant socioeconomic phenomenon globally, with millions of individuals from low- and middle-income countries seeking work opportunities abroad [1]. Bangladesh is among the leading countries contributing to the international labor workforce, with a large number of migrant workers traveling annually to the Middle East, Southeast Asia, and other regions [2]. While migration offers economic benefits to workers and their families, it also poses unique health challenges that require careful consideration, particularly during the pre-departure medical screening process [3].

Pre-departure health evaluations are essential to ensure that migrant workers are fit for overseas employment and to minimize the risk of transmitting communicable diseases [4]. Traditionally, infectious diseases such as HIV, hepatitis B and C, syphilis, and malaria have been the primary focus of these screenings [5]. However, the growing global burden of non-communicable diseases (NCDs), especially diabetes mellitus and chronic kidney disease (CKD), has underscored the importance of expanding screening protocols to include metabolic and renal health indicators [6].

Diabetes and CKD are significant public health problems worldwide, causing substantial morbidity, mortality, and economic costs [7]. Fasting blood glucose (FBG) is a simple and cost-effective test widely used to detect impaired glucose metabolism, including prediabetes and diabetes [8]. Early identification of abnormal glucose regulation allows for timely interventions that can prevent or delay the progression of diabetes and its complications [9]. Similarly, serum creatinine measurement is a key marker of renal function and is used to detect kidney impairment, which may be asymptomatic in early stages but can have serious health consequences if undiagnosed [10].

Migrant workers often face multiple health risks related to their work and living environments abroad, including limited access to healthcare and challenges in managing chronic conditions [11]. Despite these risks, there is a paucity of data on the metabolic and renal health status of outbound migrant workers at the time of pre-departure screening [12]. Understanding patterns of fasting blood glucose and serum creatinine among this population is crucial for informing targeted screening policies, enhancing occupational health measures, and improving long-term health outcomes [13].

This study aimed to assess the fasting blood glucose and serum creatinine patterns among outbound migrant workers undergoing mandatory pre-departure medical examinations in Dhaka, Bangladesh. By examining the prevalence of abnormal glucose metabolism and renal impairment in this group, the study seeks to highlight the implications for chronic disease screening and management strategies tailored to the migrant worker population. The findings may provide evidence to support the integration of metabolic and renal assessments into standard pre-departure protocols, contributing to improved health surveillance and protection for migrant workers and the communities they serve.

## **2. METHODOLOGY & MATERIALS**

This cross-sectional study was conducted at the Department of Biochemistry, Muscat Medical Center, Dhaka, Bangladesh, over a period of one year from January to December 2024. A total of 450 outbound migrant workers undergoing mandatory pre-departure medical screening were consecutively enrolled after providing informed consent. The primary objective was to assess fasting blood glucose and serum creatinine patterns among these individuals to evaluate the burden of metabolic and renal abnormalities and their implications for chronic disease screening policies in this population.

Inclusion criteria included male and female migrant workers aged 18 years and above undergoing routine pre-departure health evaluations and willing to participate in the study. Participants with incomplete biochemical data or known history of diabetes mellitus, chronic kidney disease, or other chronic metabolic conditions prior to screening were excluded.

Venous blood samples were collected following an overnight fast of at least 8 hours. Laboratory analyses included measurement of fasting blood glucose and serum creatinine. Based on biochemical and serological results, participants were categorized according to their fasting blood glucose and serum creatinine levels, using World Health Organization criteria and standard laboratory reference ranges. Fitness for overseas employment was classified as “fit,” “held up” (requiring further investigation or repeat testing), or “unfit” (due to confirmed infectious marker positivity or critical laboratory abnormalities).

Data were entered into Microsoft Excel and analyzed using SPSS version 25. Descriptive statistics, including frequencies and percentages, were calculated for fasting blood glucose and serum creatinine categories, as well as other relevant biochemical and hematological parameters. The findings were interpreted in the context of implications for chronic disease risk screening among outbound migrant workers.

### 3. RESULTS

**Table 1.** Demographic Characteristics of Study Participants (N = 450)

Characteristic	Category	Number (n)	Percentage (%)
Age (years)	<20	18	4.00%
	20–29	171	38.00%
	30–39	198	44.00%
	≥40	63	14.00%
Gender	Male	414	92.00%
	Female	36	8.00%
Education Level	No formal education	54	12.00%
	Primary	135	30.00%
	Secondary	189	42.00%
	Higher secondary+	72	16.00%
Blood Group	A Positive	126	28.00%
	B Positive	153	34.00%
	O Positive	108	24.00%
	AB Positive	45	10.00%
	Other (e.g., negative types)	18	4.00%

Table 1 presents the demographic characteristics of the 450 pre-departure migrants included in the study. The majority of participants (44%) were between 30 and 39 years of age, followed by 38% in the 20–29 age group. A smaller proportion were aged ≥40 years (14%) and <20 years (4%). The study population was predominantly male, accounting for 92% (n = 414) of the participants, while females constituted only 8% (n = 36). In terms of educational background, 42% had completed secondary education, 30% had primary education and 16% had attained higher secondary or above. A minority (12%) had no formal education. Regarding blood group distribution, B Positive was the most common (34%), followed by A Positive (28%) and O Positive (24%). AB Positive accounted for 10% of the population and 4% had other or Rh-negative blood types.

**Table 2.** Distribution of Participants by Fitness Status

Fitness Category	Number (n)	Percentage (%)
Fit	422	93.80%
Held Up	23	5.10%
Unfit	5	1.10%
Total	450	100%

Table 2 shows the distribution of study participants based on their fitness status following pre-departure medical screening. Out of 450 individuals, the majority (93.8%) were declared fit for overseas employment. A total of 23 participants (5.1%) were placed on held up status due to abnormal biochemical or borderline serological findings that required further investigation or repeat testing. Additionally, 5 participants (1.1%) were categorized as unfit due to confirmed infectious marker positivity or critical laboratory abnormalities.

**Table 3.** Distribution of Participants by Fasting Blood Glucose Level

Fasting Blood Glucose Category	Number (n)	Percentage (%)
Normal (<5.6 mmol/L)	378	84.00%
Impaired fasting glucose (5.6–6.9 mmol/L)	54	12.00%
Diabetic range (≥7.0 mmol/L)	18	4.00%
Total	450	100%

Table 3 presents the distribution of participants according to fasting blood glucose categories. The majority of migrant workers (84.0%, n = 378) had fasting glucose levels within the normal range (<5.6 mmol/L). Impaired fasting glucose, indicative of prediabetes, was observed in 12.0% (n = 54) of participants, while 4.0% (n = 18) had values in the diabetic range (≥7.0 mmol/L).

**Table 4.** *Distribution of Participants by Serum Creatinine Level*

<b>Serum Creatinine Category</b>	<b>Number (n)</b>	<b>Percentage (%)</b>
Normal	423	94.00%
Borderline high	26	5.78%
Elevated (Renal impairment)	1	0.22%
Total	450	100%

Table 4 summarizes the serum creatinine status of the study participants. The vast majority (94.0%, n = 423) had serum creatinine levels within the normal range. Borderline high values were detected in 5.78% (n = 26) of participants, while only one individual (0.22%) had an elevated level consistent with renal impairment.

#### **4. DISCUSSION**

This study assessed fasting blood glucose and serum creatinine patterns among 450 outbound migrant workers undergoing mandatory pre-departure medical screening in Dhaka, Bangladesh. The findings revealed that while the majority had normal glucose and renal function markers, a significant minority exhibited impaired fasting glucose (12%) and diabetic-range glucose (4%), alongside borderline or elevated serum creatinine in about 6% of participants. These results underscore the importance of integrating metabolic and renal screening into pre-departure evaluations to identify at-risk individuals and implement timely interventions.

Our observed prevalence of impaired fasting glucose and diabetes aligns with global trends showing a growing burden of metabolic disorders in working-age populations. Petersen and McGuire, emphasize that impaired fasting glucose represents an intermediate metabolic state with a high risk for progression to overt diabetes and associated vascular complications [14]. Early detection through simple tests like fasting glucose can therefore prevent or delay disease progression, reducing morbidity and economic costs [15]. Given the demographic profile of migrant workers, who often have limited healthcare access abroad, pre-departure screening represents a critical opportunity for chronic disease prevention.

The 4% prevalence of diabetic-range fasting glucose in this cohort is comparable to figures reported in community-based studies of similar populations in Bangladesh and neighboring countries [16]. Moreover, Elias et al., and Nang et al., have highlighted the link between hyperglycemia and the development of chronic kidney disease (CKD), a major public health issue with high morbidity and mortality [17, 18]. This relationship underlines the importance of concurrently assessing serum creatinine during screening to detect early renal impairment. In our study, 94% of participants had normal serum creatinine, with borderline and elevated levels found in 5.78% and 0.22%, respectively. While overt renal impairment was rare, borderline elevations may indicate early kidney dysfunction, warranting close follow-up. Peralta et al., demonstrated that creatinine-based detection of CKD is predictive of progression to end-stage renal disease and mortality, underscoring the clinical relevance of even modest creatinine abnormalities [19]. Additionally, Echouffo-Tcheugui et al., found that prediabetes is associated with increased risk of CKD, suggesting that the 12% with impaired fasting glucose in our cohort could be at elevated renal risk [20].

The interplay between metabolic and renal health is particularly important for migrant workers, who face occupational and lifestyle stressors abroad that may exacerbate chronic disease progression [21]. Furthermore, limited access to healthcare services and the potential for delayed diagnosis in destination countries highlight the need for effective pre-departure screening and health education [22]. Our findings support the incorporation of fasting glucose and creatinine measurements into standard migrant worker medical protocols, complementing infectious disease screening.

From a public health perspective, the identification of a substantial subgroup with abnormal glucose or renal parameters presents an opportunity for early intervention. This could include lifestyle modification counseling, referral for further medical evaluation, and targeted follow-up upon return. Cabalar et al., emphasize the pivotal role of blood testing in the prevention and management of chronic diseases and advocate for routine screening in high-risk groups [23].

Emerging technologies such as artificial intelligence (AI) and machine learning offer promising tools to enhance chronic disease detection in large populations, including migrant workers [24, 25].

Integrating these approaches with standard screening could improve risk stratification and resource allocation.

### 5. LIMITATIONS OF THE STUDY

Our study's strengths include a relatively large sample size and comprehensive biochemical assessment within the pre-departure setting. However, limitations include the cross-sectional design, which precludes causal inference, and lack of data on other metabolic parameters such as HbA1c or urine albumin-to-creatinine ratio, which may provide additional insight into glycemic control and renal function. Future longitudinal studies are warranted to track disease progression and evaluate the effectiveness of interventions initiated at screening.

### 6. CONCLUSION

In conclusion, the presence of impaired fasting glucose and borderline renal impairment among outbound migrant workers highlights an underrecognized health burden that merits attention in pre-departure medical protocols. Incorporating metabolic and renal screening can facilitate early identification and management of chronic diseases, potentially improving health outcomes for migrant populations and reducing the global burden of diabetes and CKD.

### FINANCIAL SUPPORT AND SPONSORSHIP

No funding sources.

### CONFLICTS OF INTEREST

There are no conflicts of interest.

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**Citation:** Dr. Salma Sadiya et al. "Fasting Blood Glucose and Serum Creatinine Patterns in Outbound Migrant Workers: Implications for Chronic Disease Screening". *International Journal of Research Studies in Microbiology and Biotechnology (IJRSMB)*, vol 10, no. 2, 2025, pp. 1-6. DOI: <https://doi.org/10.20431/2454-9428.1002001>.

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