

Diabetes Mellitus in Bangladesh Police Force: Relation with Work Stress and Lifestyle Habits

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ABSTRACT: Background: Diabetes mellitus is rising at an alarming pace worldwide, with South-East Asia and Bangladesh emerging as critical hotspots due to rapid urbanization, unhealthy diets, and sedentary lifestyles. Alongside these lifestyle determinants, occupational stress, disrupted sleep, and irregular routines, particularly among police officers, further heighten vulnerability to the disease. Though limited research has explored these intersections in Bangladesh, there is an urgent need to investigate how work stress and lifestyle factors shape diabetes risk in this high-risk occupational group.

Methods:

This cross-sectional study explored the association of work stress, lifestyle habits, and diabetes among Bangladeshi police officers across multiple stations over a five-month period. A total of 306 active-duty personnel aged 20–55 years with at least six months of service were included through convenience sampling. Data were gathered using a semi-structured questionnaire covering socio-demographic details, occupational history, lifestyle practices, and diabetes-related information.

Results:

The study revealed that while most police officers were free from diabetes, a notable proportion was affected, highlighting its importance as a public health issue within this occupational group. Age, family history, and hypertension emerged as strong demographic and comorbidity-related factors, whereas sex, marital status, and education showed little influence. Lifestyle behaviors were largely similar between groups, though the use of smokeless tobacco products stood out as being more common among those with diabetes. Occupational patterns showed that lower rank, higher income, and especially longer job duration were strongly associated with diabetes, reflecting the cumulative impact of prolonged service. On the other hand, duty hours, sleep patterns, and perceived job stress appeared to play a lesser role in disease prevalence.

Conclusions:

This study shows that diabetes among Bangladeshi police officers is shaped by age, family history, hypertension, tobacco use, and long service duration, with lower ranks being especially vulnerable.

Keywords: *Diabetes Mellitus, Bangladesh Police, Occupational Stress, Workplace Health, Occupational Epidemiology*

INTRODUCTION

Diabetes mellitus (DM) has emerged as one of the most pressing global health challenges, with the age-standardized prevalence among adults rising from 4.3% in 1980 to 9.0% in 2014 in men and from 5.0% to 7.9% in women¹. In 2013, an estimated 382 million people worldwide were living with diabetes, a figure projected to reach 592 million by 2035². By 2019, this number had already escalated to 463 million adults, with forecasts suggesting 700 million cases by 2045³. If unchecked, current trajectories predict that 1 in 3 adults will be diabetic by 2050⁴. 80% of people with diabetes reside in low- and middle-income countries (LMICs), with South-East Asia identified as a major hotspot due to rapid urbanization and lifestyle shifts². Bangladesh reflects this global crisis acutely, with more than 19 million adults, over one quarter of the adult population, living with diabetes or prediabetes as of 2020³. In

2019, Bangladesh ranked 10th globally in terms of adult diabetes cases, with 8.4 million affected individuals, a figure projected to rise to 15 million by 2045, elevating the country to the 9th position worldwide³. The surge in diabetes is closely linked to lifestyle transitions driven by urbanization and Westernization, including diets rich in excess calories, saturated fats, and sugar-sweetened beverages, which contribute to obesity and insulin resistance^{5,6}. While unhealthy diets heighten risks, studies consistently show that intensive lifestyle interventions, particularly caloric restriction and weight management, significantly reduce the burden of prediabetes and diabetes^{7,8}. Physical inactivity is another critical risk factor. Regular moderate physical activity of at least 150 minutes per week can improve glycemic control and reduce diabetes incidence by nearly 60% in high-risk groups^{4,9,10}. In addition to lifestyle determinants, occupational exposures significantly influence diabetes risk. Chronic occupational stress alters blood glucose regulation and increases susceptibility to metabolic syndrome^{8,11}. Professions such as policing are particularly vulnerable due to prolonged duty hours, unpredictable schedules, exposure to trauma, and high-pressure decision-making^{11,12}. In India, 70% of police personnel reported at least moderate levels of work-related stress, with disrupted sleep and irregular meals compounding metabolic risks¹². Poor sleep quality and deprivation further impair glucose tolerance and insulin sensitivity¹³. The underlying pathophysiology suggests that chronic stress activates the sympathetic nervous system, driving elevations in plasma glucose and blood pressure through impaired glucose and lipid metabolism and enhanced norepinephrine release^{8,13}. Within the police force, these stressors converge uniquely, making officers particularly susceptible to diabetes. Despite these risks, limited studies have examined the intersection of occupational stress, lifestyle behaviors, and diabetes in Bangladeshi police personnel. This knowledge gap highlights the urgency of investigating how work stress, exercise, and sleep patterns contribute to the development of diabetes in this occupational group. Understanding these associations is crucial not only for improving health outcomes among police officers but also for informing occupational health policies and targeted preventive strategies within the Bangladesh Police Force.

METHODS

This study adopted a cross-sectional research design to investigate the relationship between work stress, lifestyle habits, and diabetes mellitus among Bangladeshi police officers. The research was carried out across different police stations in Bangladesh over a five-month period, from January 2022 to May 2022. A total of 306 police officers constituted the study sample, selected through a convenience sampling technique to ensure feasibility within the operational constraints of police work. The inclusion criteria required participants to be active duty police personnel aged between 20 and 55 years, with a minimum of six months of service experience, thereby ensuring adequate exposure to occupational demands. Officers of undefined diabetes status were excluded from the study. Data were collected using a semi-structured questionnaire, which was carefully designed to capture socio-demographic characteristics, occupational history, lifestyle behaviors such as exercise and sleep patterns, and diabetes-related information.

RESULTS

Table 1: Distribution of respondents according to the presence of DM.

| Variable | Number | Percentage |
|----------|--------|------------|
| Present | 51 | 16.7 |
| Absent | 255 | 83.3 |

Table 1 illustrates the overall distribution of diabetes mellitus among the study participants, highlighting that while the majority of police officers were free from the condition, a considerable proportion was found to be affected. This finding highlights that the presence of a high number of diabetes mellitus within the police force signals an important public health concern.

Table 02: distribution of respondents according to demographic and comorbidity variables

| Variable | DM Present (n=51) | DM Absent (n=255) | p-value |
|----------|----------------------|----------------------|---------|
| Age | | | |
| 20 - 30 | 0 (0%) | 17 (6.7%) | 0.008 |

| | | | |
|----------------------|------------|-------------|--------|
| 31 - 40 | 13 (25.5%) | 103 (40.4%) | |
| 41 - 50 | 29 (56.9%) | 113 (44.3%) | |
| 51 - 55 | 9 (17.6%) | 21 (8.2%) | |
| Sex | | | |
| Male | 49 (96.1%) | 241 (94.5%) | 1.0 |
| Female | 2 (3.9%) | 14 (5.5%) | |
| Marital status | | | |
| Married | 51 (100%) | 253 (99.2%) | 1.0 |
| Unmarried | 0 (0%) | 2 (0.8%) | |
| Educational level | | | |
| SSC / equivalent | 30 (58.8%) | 119 (46.7%) | 0.3 |
| HSC / equivalent | 10 (19.6%) | 47 (18.4%) | |
| Honors / equivalent | 6 (11.8%) | 42 (16.5%) | |
| Masters | 5 (9.8%) | 47 (18.4%) | |
| Family history | | | |
| Positive | 27 (52.9%) | 52 (20.4%) | <0.001 |
| Negative | 18 (35.3%) | 168 (65.9%) | |
| Unknown | 6 (11.8%) | 35 (13.7%) | |
| Hypertension history | 21 (41.2%) | 60 (23.5%) | 0.01 |

*p-value was calculated by using chi-square test for categorical and t-test for quantitative variables.
Fisher's exact test was done if any of cell had expected value less than 5*

Table 02 presents the distribution of respondents according to their demographic and comorbidity characteristics. The findings suggest that increasing age was significantly related to diabetes, with a greater proportion of older officers being affected compared to their younger counterparts. Sex and marital status did not appear to exert any meaningful influence on diabetes occurrence, as both groups were fairly similar in these respects. Educational attainment also showed no significant relationship, indicating that formal education levels were not strongly linked with diabetes in this population. A strong association emerged with family history, where those with a positive background of diabetes were considerably more likely to be affected themselves. Hypertension was found to be significantly associated, with officers reporting a history of high blood pressure demonstrating a greater likelihood of having diabetes. Taken together, Table 02 highlights that while demographic factors such as age play a role, comorbid conditions and hereditary predispositions exert a more prominent influence on the presence of diabetes among police personnel.

Table 03: distribution of respondents according to lifestyle related variables

| Variable | DM Present (n=51) | DM Absent (n=255) | p-value |
|---------------------------------|----------------------|----------------------|---------|
| Smoking history | | | |
| Absent | 38 (74.5%) | 209 (82%) | 0.2 |
| ≤5 years | 2 (3.9%) | 16 (6.3%) | |
| >5 years | 11 (21.6%) | 30 (11.8%) | |
| History of taking pan/gul/zarda | 4 (7.8%) | 4 (1.6%) | 0.03 |
| Alcohol consumption history | 0 (0%) | 1 (0.4%) | 1.0 |
| Regular exercise | | | |
| Mild | 11 (21.6%) | 58 (22.7%) | 0.9 |

| | | | |
|-------------------------------|------------|-------------|-----|
| Moderate | 33 (64.7%) | 150 (58.8%) | |
| Vigorous | 0 (0%) | 3 (1.2%) | |
| No exercise | 7 (13.7%) | 44 (17.3%) | |
| Food Habit | | | |
| Home made food | 32 (62.7%) | 161 (63.4%) | |
| Street food | 3 (5.9%) | 11 (4.3%) | 0.8 |
| No fixed diet | 16 (31.4%) | 82 (32.3%) | |
| Regular vegetable consumption | 34 (66.7%) | 187 (74.8%) | 0.4 |

p-value was calculated by using chi-square test for categorical and t-test for quantitative variables.

Fisher's exact test was done if any of cell had expected value less than 5

Table 03 highlights the lifestyle-related characteristics of the respondents in relation to diabetes mellitus, showing that most lifestyle factors did not differ significantly between those with and without the disease. Smoking history showed some variation, with a tendency for longer duration of smoking to be more common among those with diabetes, though this was not statistically significant. The use of pan, gul, or zarda, however, emerged as a factor with a noteworthy association, being more prevalent among diabetic respondents. Alcohol consumption was almost negligible across both groups, suggesting it plays little role in this context. Patterns of physical activity, ranging from mild to moderate exercise, appeared similar in both groups, with very few reporting vigorous activity, and a small portion reporting no exercise at all. Dietary habits, including reliance on home-cooked meals, street food, or no fixed diet, showed no meaningful differences, nor did the regular consumption of vegetables. Table 03 overall suggests that while most lifestyle behaviors were similar across groups, the use of smokeless tobacco products was more strongly linked with the presence of diabetes among police officers.

Table 04: distribution of respondents according to occupation related variables

| Variable | DM Present (n=51) | DM Absent (n=255) | p-value |
|------------------|----------------------|----------------------|---------|
| Rank | | | |
| Constable / Naik | 35 (68.6%) | 116 (45.5%) | 0.003 |
| ASI | 9 (17.6%) | 55 (21.6%) | |
| Sergeant / SI | 2 (3.9%) | 63 (24.7%) | |
| Inspector | 4 (7.8%) | 13 (5.1%) | |
| ASP / SASP | 0 (0%) | 3 (1.2%) | |
| SP / ASP | 1 (2%) | 5 (2%) | |
| Salary | | | |
| 10,000-15,000 | 6 (11.8%) | 10 (10%) | 0.009 |
| 15,001-20,000 | 1 (2%) | 32 (12.7%) | |
| 20,001-25,000 | 7 (13.7%) | 55 (21.8%) | |
| 25,001-30,000 | 2 (3.9%) | 23 (9.1%) | |
| 30,001-35,000 | 9 (17.6%) | 44 (17.5%) | |
| >35,000 | 26 (51%) | 88 (34.9%) | |
| Duty hours | | | |
| 6-8 hours | 6 (11.8%) | 56 (22%) | 0.2 |
| 9-12 hours | 26 (51%) | 128 (50.2%) | |
| Above | 18 (35.3%) | 64 (25.1%) | |

| | | | |
|------------------|------------|-------------|-------|
| Not fixed | 1 (2%) | 7 (2.7%) | |
| Job duration | | | |
| 1-3 years | 0 (0%) | 2 (0.8%) | 0.002 |
| 4-6 years | 1 (2%) | 33 (13.2%) | |
| 7-10 years | 0 (0%) | 24 (9.6%) | |
| 11-15 years | 5 (9.8%) | 32 (12.8%) | |
| Above | 45 (88.2%) | 159 (63.6) | |
| Sleep cycle | | | |
| <7 hours | 40 (78.4%) | 174 (68.2%) | 0.4 |
| 7-9 hours | 10 (19.6%) | 74 (29%) | |
| >9 hours | 0 (0%) | 1 (0.4%) | |
| Not fixed | 1 (2%) | 6 (2.4%) | |
| Job stress level | | | |
| Mild | 24 (47.1%) | 110 (43.1%) | 0.8 |
| Moderate | 18 (35.3%) | 101 (39.6%) | |
| Severe | 9 (17.6%) | 44 (17.3%) | |

p-value was calculated by using chi-square test for categorical and t-test for quantitative variables. Fisher's exact test was done if any of cell had expected value less than 5

Table 04 presents the occupational characteristics of the respondents in relation to diabetes mellitus, revealing several important associations. The findings show that diabetes was more common among lower-ranked officers, particularly constables and naiks, whereas higher-ranking officers were less frequently affected. Income level also appeared to play a significant role, with diabetes being more prevalent among

those with higher salaries, possibly reflecting sedentary lifestyle with career progression, cumulative occupational stress and advancing age. Job duration showed a strong association, as the vast majority of diabetic respondents had been in service for many years compared to their non-diabetic counterparts, indicating the cumulative impact of prolonged occupational exposure. Duty hours, although generally long across both groups, did not demonstrate a significant difference in relation to diabetes, nor did patterns of sleep duration, where inadequate rest was common in both diabetic and non-diabetic officers. Levels of job stress, ranging from mild to severe, were distributed in almost equal proportions across the two groups. Table 04 highlights that rank, salary, and especially longer job duration are key occupational factors linked with diabetes among police officers, while duty hours, sleep cycle, and stress levels showed less influence in this study population.

DISCUSSION

In our study, diabetes was more frequent among older respondents, while younger officers were largely unaffected. This aligns with extensive evidence showing age as a strong predictor of diabetes. In Bangladesh, individuals with diabetes had a median age of 46 years compared to 35 years in those without the disease, and those aged 50–54 years had more than three times higher risk compared to those aged 18–34 years³. Among Indian police officers aged 50 years or older were nearly five times more likely to develop diabetes¹¹, while another study reported that being younger reduced the risk of diabetes by 50–70% for every 10 years of age difference¹⁴. In Ethiopian police, individuals aged 45 years or above were nearly five times more at risk of impaired fasting glucose compared to those under 25¹⁰. In terms of sex, diabetes occurred at nearly equal proportions among male and female officers in this study, and no meaningful difference was observed. This finding resonates with results from studies among Indian and Ethiopian police, where gender was not significantly associated with diabetes^{10,11}. Population-level studies show variable results; in Bangladesh, men were about 1.2 times more likely to have diabetes than women³, whereas in Thailand, women had significantly higher odds than men, with adjusted odds ratios of 2.09 in 2010 and 1.78 in 2012⁶. Marital status did not appear to influence diabetes in this study, as virtually all participants were married, and a

similar observation was made in Thailand, where marital status showed no statistical significance in diabetes risk⁶. With respect to education, diabetes was not significantly related to educational attainment among police officers in this study. This is consistent with findings from Bangladesh, where education was not significantly associated with diabetes³, and in Indian police, where dysglycemia showed no link to education level¹¹. A Thai study observed a higher risk of diabetes among individuals with lower educational attainment, with an adjusted odds ratio of 5.87 in 2010 and 1.22 in 2012, suggesting that education may shape awareness and responsiveness to health information⁶ [Suwannaphant et al., 2017]. A family history of diabetes showed a strong association in this study, with those reporting affected relatives being more likely to have the disease. This finding is well supported in the literature; Chinese adults with a family history had a hazard ratio of 1.68 for developing diabetes¹⁴, Indian police with such a history were more than three times at risk¹¹, and Ethiopian police with first-degree relatives suffering from diabetes had almost seven times higher odds of diabetes and more than three times higher odds of impaired fasting glucose¹⁰. In South India, though family history was more frequent among those who converted to diabetes, it did not remain significant in adjusted analyses¹⁵. Hypertension was more prevalent among diabetic officers in this study, echoing findings from other settings. In Bangladesh, hypertension was strongly linked to diabetes, with a prevalence ratio of 1.51³. Among Indian police, hypertension increased the risk of diabetes 1.55 times¹¹, while in urban South India, hypertensive individuals had more than double the risk of diabetes at follow-up¹⁵. Ethiopian police with hypertension were at an even greater risk, being nearly seven times more likely to have diabetes and also more prone to impaired fasting glucose¹⁰.

Smoking history did not show a significant difference between those with and without diabetes in our study, although a slightly higher proportion of long-term smokers were found among the diabetic group. This is consistent with findings from Bangladesh, where smoking status was not significantly associated with diabetes³, and among Indian police personnel, where 23% reported tobacco smoking but no statistical link with diabetes was observed¹². In Ethiopian police officers, 6.7% were ever smokers and 74.6% of them were current smokers, yet no significant association with diabetes was found¹⁰. One study in Chinese adults even reported a decreased

risk of incident diabetes among current smokers, with a hazard ratio of 0.79¹⁴. The use of smokeless tobacco products such as pan, gul, and zarda was more common among officers with diabetes in this study, suggesting a potential association. While comparable studies are limited, one report from Ethiopia highlighted “khat chewing” among 11.1% of police officers, though this behavior was not statistically associated with diabetes¹⁰. Alcohol consumption showed no meaningful relationship with diabetes in this study, with almost negligible consumption reported among the participants. This contrasts with much higher rates elsewhere, such as 45.7% among police in South India¹² and 70.9% among Ethiopian police officers¹⁰, though in both cases alcohol intake was not significantly linked to diabetes. A Bangladeshi population study found no significant association³, while in China, alcohol consumption was adjusted for as a confounding factor rather than a direct predictor¹⁴. Regarding exercise, most officers in this study reported mild to moderate levels of activity, with very few engaging in vigorous exercise and some reporting none at all, and no significant difference emerged between diabetic and non-diabetic groups. Comparable findings have been reported elsewhere: in Indian police, only 10.5% reported regular exercise, yet no link to dysglycemia was observed¹¹, and in urban South India, physical activity at baseline did not influence the development of diabetes at follow-up¹⁵. Ethiopian police showed a higher prevalence of vigorous activity (44.9%) alongside moderate (18.2%) and poor (36.9%) activity levels, where physical inactivity emerged as an important factor for both diabetes and impaired fasting glucose¹⁰. Dietary habits did not show meaningful differences in this study, with most participants relying on home-cooked food, some consuming street food, and others reporting no fixed diet. One Thai study suggested that diet quality may be indirectly linked to diabetes through educational attainment, with lower education associated with poorer dietary patterns and higher risk⁶. Regular vegetable consumption also showed no significant association in this study, which mirrors findings from Ethiopian police, where low intake of fruits and vegetables was reported by 91.2% but did not emerge as a statistically significant predictor of diabetes¹⁰.

In our cohort, diabetes clustered among lower ranks and rank showed a significant association with disease status, whereas higher ranks were less represented among

those affected; this contrasts with one study that reported higher-ranking officers had markedly increased odds of diabetes¹⁰, while another found no association by rank¹¹. We also observed that higher salary bands were more common among officers with diabetes, aligning with population evidence from Bangladesh where diabetes concentrated in higher wealth quintiles³ and with Thai data linking higher monthly income to greater diabetes risk⁶. By contrast, duty hours appeared broadly similar across groups in our data, with no significant association; still, police work elsewhere is characterized by long shifts¹², and one study described a dose–response relationship between rotating night-shift work and incident diabetes even after adjusting for BMI¹¹. Years of service stood out in our findings, with longer job duration more frequently accompanying diabetes, whereas two studies reported no significant link, whether comparing 1–10, 11–20, and >20 years in Ethiopian police¹⁰ or >10 versus <10 years in Indian police¹¹. Sleep duration showed no meaningful difference between diabetic and non-diabetic officers in our sample, echoing descriptive reports of disrupted sleep among police without a quantified association with diabetes¹². Perceived job stress was similarly distributed across groups and not statistically related to diabetes in our setting, a pattern consistent with findings where, despite 70% of police reporting at least moderate stress and 4% labeling it a problem, stress did not predict diabetes after adjustment¹²; other studies likewise frame occupational stress as a plausible vulnerability factor but not a confirmed independent determinant in multivariate models^{10,11}.

CONCLUSION:

This study highlights that diabetes mellitus among Bangladeshi police officers is influenced by a complex interplay of age, family history, hypertension, lifestyle behaviors, and occupational exposures, with longer job duration and lower ranks emerging as notable risk factors. While income and lifestyle habits such as smokeless tobacco use showed associations, variables like education, marital status, exercise, and job stress did not demonstrate consistent relationships. These findings highlight the importance of tailored preventive strategies targeting high-risk groups within the police force to reduce the burden of diabetes and its complications. The study's cross-sectional design, reliance on convenience sampling, and use of self-reported

lifestyle data limit causal inference and generalizability, warranting larger, longitudinal studies to validate and extend these observations.

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DECLARATIONS

Ethical approval: This study was approved by the academic and institutional ethical review board of the North South University.

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