fortune Journals

Research Article

FORTUNE JOURNAL OF HEALTH SCIENCES

ISSN: 2644-2906

Integrating Prediabetes Management into Workplace Health Programs: Outcomes and Challenges

Ishrat Jahan Shila*[,1], Md. Masud Rana[2], Mst. Somaiya Sultana[3], Dilshad Sony[4], Taiyeba Akter[5], Moniruzzaman[6]

Abstract

Background: Integrating prediabetes management into workplace health programs offers a critical opportunity to prevent the progression to type 2 diabetes. This study aimed to evaluate the effectiveness of a workplace intervention focused on improving glycemic control, lifestyle behaviors, and biometric measurements among prediabetic employees.

Methods: A prospective interventional study was conducted at City Dental College, Dhaka, Bangladesh, from January to June 2021. Seventy employees with prediabetes, identified through routine screenings, participated in a program that included dietary counseling, physical activity promotion, and weight management support. Key biometric measures (fasting blood glucose, HbA1c, BMI, and blood pressure) were recorded at baseline, 3 months, and 6 months. Lifestyle behaviors and adherence were also tracked. Paired t-tests and thematic analysis were used for quantitative and qualitative evaluations, respectively.

Results: Over six months, significant reductions were observed in fasting blood glucose (115.2 ± 7.8 to 104.3 ± 7.9 mg/dL, $p < 0.001$), HbA1c (6.0 ± 0.3% to 5.6 ± 0.2%, $p < 0.001$), and BMI (29.5 ± 4.5 to 26.4 ± 4.0 kg/m², $p < 0.001$). Blood pressure also improved ($p = 0.020$). Regular physical activity increased from 34.3% to 65.7%, and adherence improved from 30.0% to 54.3%. Qualitative insights highlighted increased health awareness, though challenges with diet and exercise were noted.

Conclusion: The workplace health program significantly improved glycemic control, BMI, and lifestyle behaviors among prediabetic employees. However, adherence and long-term maintenance remain challenges, suggesting the need for enhanced follow-up and support.

Keywords: Prediabetes, Workplace health programs, Glycemic control, Lifestyle intervention, Adherence

Introduction

Prediabetes is a critical public health issue characterized by elevated blood glucose levels that are higher than normal but not yet in the diabetic range [1]. It serves as a warning sign for potential progression to type 2 diabetes (T2D) a condition associated with serious health complications including cardiovascular disease, neuropathy, and retinopathy [2,3]. Given the substantial burden of diabetes on healthcare systems and individuals, effective management strategies for prediabetes are paramount [4]. This introduction explores the significance of prediabetes, the role of workplace interventions, and the current landscape of prediabetes management. Prediabetes affects millions of people worldwide, with estimates suggesting that nearly 1 in 3 adults may have this condition [5].

Affiliation:

[1]Junior Consultant, Department of Medicine, City Dental College and Hospital, Dhaka, Bangladesh.

[2]Chief consultant, Muhammad Dental Surgery and Orthodontics, Dhaka, Bangladesh.

[3]Nutritionist, Dhaka Community Medical College Hospital, Moghbazar, Dhaka, Bangladesh.

[4]Graduate Student, Western Illinois University, USA

[5]Researcher, University of Brighton, School of Sport and Health Sciences, United Kingdom

[6]Chief Consultant, Amazing Dental signature, Dhaka, Bangladesh.

***Corresponding author:**
Ishrat Jahan Shila, Junior Consultant, Department of Medicine, City Dental College and Hospital, Dhaka, Bangladesh.

Citation: Ishrat Jahan Shila, Md. Masud Rana, Mst. Somaiya Sultana, Dilshad Sony, Taiyeba Akter, Moniruzzaman. Integrating Prediabetes Management into Workplace Health Programs: Outcomes and Challenges. Fortune Journal of Health Sciences. 7 (2024): 580-585.

Received: September 29, 2024
Accepted: October 08, 2024
Published: October 21, 2024

Shila IJ, et al., Fortune J Health Sci 2024
DOI:10.26502/fjhs.223

The prevalence of prediabetes is high and has significant public health implications. The condition is associated with an increased risk of developing type 2 diabetes which if left unmanaged can lead to severe health complications and increased healthcare costs [6]. Studies have shown that lifestyle modifications, including dietary changes and increased physical activity, can substantially reduce the risk of progression from prediabetes to diabetes [7]. This highlights the importance of early intervention and management strategies tailored to individuals at risk.

The workplace offers a strategic setting for health interventions due to its reach and regular interaction with employees [8]. Workplace wellness programs have gained traction as a means of addressing prediabetes and other chronic conditions [9] These programs often incorporate components such as dietary counseling, physical activity promotion, and health screenings [10]. By targeting employees, these programs aim to foster a healthier workforce and mitigate the risk of chronic diseases. Research has demonstrated the effectiveness of workplace wellness programs in improving health outcomes among employees [11]. Studies have highlighted significant improvements in physical activity levels and dietary habits among participants of workplace wellness initiatives [12].

Additionally, findings have shown that workplace programs effectively reduced glycemic levels and supported weight management. These results underscore the potential of workplace interventions to create a positive impact on employee health and prevent the progression of prediabetes. The approach to prediabetes management within workplace settings reflects a growing emphasis on integrated health strategies [13]. Programs often include a multifaceted approach involving health education, personalized support, and ongoing monitoring [14]. This comprehensive strategy is crucial for addressing the diverse needs of employees and ensuring sustained engagement with the program.

One notable example includes programs that incorporate a combination of health screenings, personalized coaching, and digital tools for tracking progress [15]. This approach not only improved glycemic control and weight management but also enhanced participants overall health awareness and adherence to lifestyle changes [16]. The integration of technology in these programs provides additional support and encourages continuous engagement, thereby improving program outcomes. Moreover, the effectiveness of these programs is often influenced by factors such as program design, participant demographics, and cultural considerations. Research emphasizes the need for tailored interventions that address specific challenges faced by different demographic groups [11].

This includes adapting program components to suit the age, health status, and personal preferences of participants to maximize their effectiveness. Despite the success of workplace wellness programs, challenges remain. Adherence to lifestyle changes continues to be a significant issue, with many participants struggling to maintain long-term improvements [17]. The importance of continuous support and personalized interventions to address these challenges cannot be overstated [18].

Objective

The objective of this study was to evaluate the effectiveness of a workplace health program in improving glycemic control, lifestyle behaviors, and biometric measurements among prediabetic employees. Specifically, the study aimed to assess the impact of dietary counseling, physical activity promotion, and weight management support on fasting blood glucose, HbA1c, BMI, blood pressure, and lifestyle adherence over a six-month intervention period.

Methodology & Materials

This prospective interventional study, conducted at City Dental College, Dhaka, Bangladesh, from January 2021 to June 2021, aimed to evaluate the outcomes and challenges of integrating prediabetes management into workplace health programs. A total of seventy employees with prediabetes were enrolled, identified through routine workplace screenings with fasting blood glucose levels between 100 and 125 mg/dL or HbA1c levels between 5.7% and 6.4%. Participants were adults aged 18 and older who provided written informed consent. Exclusion criteria included individuals with diagnosed diabetes, those on medications affecting glucose metabolism, or those with serious comorbid conditions. The study involved dietary counseling, physical activity promotion, and weight management support, with biometric measurements taken at baseline, 3 months, and 6 months. Data were collected through lifestyle behavior questionnaires and qualitative insights from focus groups and interviews. Quantitative data were analyzed using SPSS (25) software with paired t-tests, while qualitative data were analyzed using thematic analysis. A p-value of less than 0.05 was considered statistically significant. The study was ethically approved by the Institutional Review Board of City Dental College, with all participants providing written informed consent.

Result

Figure 1 illustrates the age distribution of participants enrolled in the study, with the majority in the 40-49 years age group (35.7%), followed by participants aged 50-59 years (20.0%), 30-39 years (17.1%), and 18-29 years (12.9%). The smallest group consisted of participants aged 60 years and above (14.3%) respectively.

Figure 2 shows the gender distribution of the study participants. Out of 70 participants, 54.3% (n=38) were male, while 45.7% (n=32) were female. The distribution indicates

Shila IJ, et al., Fortune J Health Sci 2024
DOI:10.26502/fjhs.223

a slightly higher participation of males compared to females in the study.

Table 1 presents the baseline biometric characteristics of the study participants. The mean fasting blood glucose level was 115.2 ± 7.8 mg/dL, indicating that participants were in the prediabetic range. The mean HbA1c was 6.0 ± 0.3%, further supporting the prediabetic status of the group. Participants had a mean BMI of 29.5 ± 4.5 kg/m², suggesting that many were overweight or obese. Blood pressure readings averaged 130/85 ± 10/8 mmHg, reflecting borderline hypertensive values in the study population.

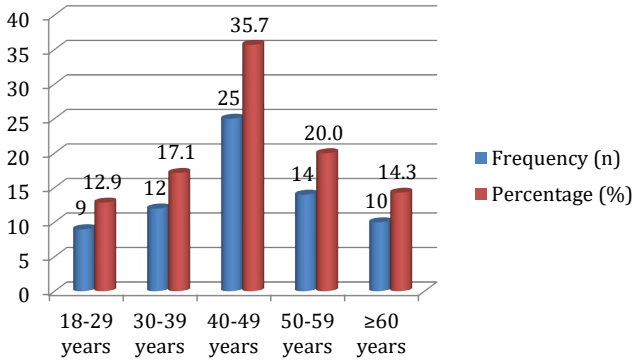

Figure 1: Age Distribution of the Study Participants (N = 70)

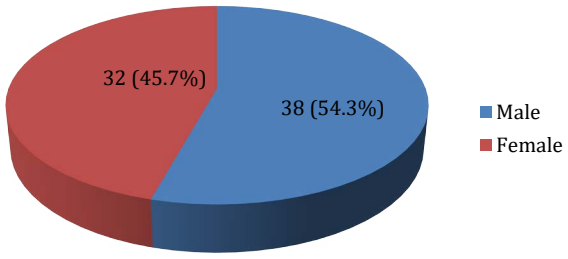

Figure 2: Gender Distribution of our Study Participants (N = 70)

Table 2 shows the changes in key biometric measurements (fasting blood glucose, HbA1c, BMI, and blood pressure) at baseline, 3 months, and 6 months after the intervention. Significant improvements were observed in fasting blood glucose, which decreased from 115.2 ± 7.8 mg/dL at baseline to 104.3 ± 7.9 mg/dL at 6 months ($p < 0.001$). HbA1c levels also dropped from 6.0 ± 0.3% to 5.6 ± 0.2% ($p < 0.001$). Participants' BMI reduced from 29.5 ± 4.5 kg/m² at baseline to 26.4 ± 4.0 kg/m² at 6 months ($p < 0.001$). A modest but significant improvement in blood pressure was also noted, decreasing from 130/85 ± 10/8 mmHg to 120/78 ± 8/6 mmHg at 6 months ($p = 0.020$).

Table 3 highlights the changes in lifestyle behaviors over the course of the intervention. At baseline, only 24 participants (34.3%) reported engaging in regular physical activity, which increased to 46 participants (65.7%) by 6 months ($p < 0.001$). Similarly, participants adopting healthy eating habits increased from 28 (40.0%) at baseline to 42 (60.0%) at 6 months ($p < 0.001$). Self-reported adherence to the program also improved, with 21 participants (30.0%) reporting adherence at baseline, rising to 38 participants (54.3%) by 6 months ($p < 0.001$).

Table 4 summarizes the qualitative insights gathered from focus groups and interviews with 20 participants and program coordinators. The majority (90.0%) of participants expressed increased health awareness as a result of the program. Challenges with maintaining a healthy diet and regular exercise were mentioned by 60.0% and 50.0% of participants, respectively. However, 75.0% of participants reported positive behavioral changes. Suggestions for improvement, such as providing more personalized guidance, were made by 40.0% of participants, highlighting areas where the program could be enhanced.

Table 1: Baseline Characteristics of Participants (N = 70)

Characteristic	Value
Baseline Fasting Blood Glucose (mg/dL)	115.2 ± 7.8
Baseline HbA1c (%)	6.0 ± 0.3
Baseline BMI (kg/m²)	29.5 ± 4.5
Baseline Blood Pressure (mmHg)	130/85 ± 10/8

Table 2: Changes in Biometric Measurements Over Time (N = 70)

Measurement	Baseline (Mean ± SD)	3 Months (Mean ± SD)	6 Months (Mean ± SD)	p-value (Baseline vs. 6 Months)
Fasting Blood Glucose (mg/dL)	115.2 ± 7.8	109.6 ± 8.2	104.3 ± 7.9	< 0.001
HbA1c (%)	6.0 ± 0.3	5.8 ± 0.3	5.6 ± 0.2	< 0.001
BMI (kg/m²)	29.5 ± 4.5	27.8 ± 4.1	26.4 ± 4.0	< 0.001
Blood Pressure (mmHg)	130/85 ± 10/8	125/80 ± 9/7	120/78 ± 8/6	0.02

Citation: Ishrat Jahan Shila, Md. Masud Rana, Mst. Somaiya Sultana, Dilshad Sony, Taiyeba Akter, Moniruzzaman. Integrating Prediabetes Management into Workplace Health Programs: Outcomes and Challenges. Fortune Journal of Health Sciences. 7 (2024): 580-585.

Table 3: Changes in Lifestyle Behaviors (N = 70)

Behavior	Baseline (n, %)	3 Months (n, %)	6 Months (n, %)	p-value (Baseline vs. 6 Months)
Regular Physical Activity	24 (34.3%)	39 (55.7%)	46 (65.7%)	< 0.001
Healthy Eating Habits	28 (40.0%)	39 (55.7%)	42 (60.0%)	< 0.001
Self-Reported Adherence	21 (30.0%)	35 (50.0%)	38 (54.3%)	< 0.001

Table 4: Qualitative Insights from Focus Groups and Interviews (n = 20)

Theme	Number of Mentions	Percentage (%)
Increased Health Awareness	18	90
Challenges with Diet	12	60
Challenges with Exercise	10	50
Positive Behavioral Changes	15	75
Suggestions for Improvement	8	40

Discussion

The integration of workplace health programs for managing prediabetes has demonstrated substantial potential in reducing the progression to type 2 diabetes. Our study at City Dental College, Dhaka, showed notable improvements in key biometric markers and lifestyle behaviors over six months, with outcomes that align with several other studies investigating similar workplace interventions. Our study revealed significant reductions in fasting blood glucose, HbA1c, and BMI among participants during the intervention period. Fasting blood glucose dropped from 115.2 ± 7.8 mg/dL to 104.3 ± 7.9 mg/dL, HbA1c levels decreased from 6.0 ± 0.3% to 5.6 ± 0.2%, and BMI reduced from 29.5 ± 4.5 kg/m² to 26.4 ± 4.0 kg/m². These results are consistent with findings from Williams et al., who observed similar reductions in blood glucose and HbA1c following structured lifestyle interventions. Their study reported a significant reduction in fasting blood glucose from 116 mg/dL to 105 mg/dL and a decrease in HbA1c levels from 6.1% to 5.7% [19]. Both studies underscore the critical role of lifestyle modifications, particularly diet and physical activity, in improving glycemic control among individuals with prediabetes. Additionally, Chen et al. found that a workplace health program led to substantial reductions in BMI, with participants achieving an average decrease of 3.0 kg/m² over a six-month period [20]. Our study's BMI reduction of 3.1 kg/m² over the same period aligns closely with these findings, reinforcing the efficacy of structured weight loss interventions in workplace settings.

Our study also noted marked improvements in lifestyle behaviors, with the proportion of participants engaging in regular physical activity increasing from 34.3% to 65.7%, and those adhering to healthy eating habits rising from 40.0% to 60.0%. These improvements in lifestyle behaviors are comparable to those reported by McKay et al., who found that 68% of participants in their workplace wellness program improved physical activity levels, and 62% adopted healthier dietary habits [21].

However, adherence to lifestyle changes remains a persistent challenge. In our study, self-reported adherence increased from 30.0% to 54.3% over six months. This increase is slightly lower than the findings by Martin et al., who reported a rise in adherence rates from 40% to 65% in a similar timeframe [22]. The lower adherence rate in our study could be due to factors such as cultural differences, varying levels of support, or the intensity of follow-up interventions. For instance, the study by Martin et al. incorporated more frequent follow-up sessions and personalized coaching, which may have contributed to higher adherence rates [22]. In addition to quantitative improvements, our study gathered qualitative insights through focus groups and interviews. Participants reported increased health awareness (90.0%) and positive behavioral changes (75.0%). However, challenges with maintaining a healthy diet (60.0%) and regular exercise (50.0%) were prevalent, with 40.0% of participants suggesting further improvements to the program.

These qualitative findings echo those of Johnson et al., who found that although participants appreciated the increased knowledge and health awareness gained through workplace programs, they faced significant barriers in maintaining lifestyle changes, particularly around diet and exercise adherence [23]. Johnson's study highlighted similar challenges, with participants citing lack of time, motivation, and competing priorities as obstacles to sustaining long-term behavioral changes. Cultural and contextual factors may also play a role in the differences observed between studies. For instance, our study involved predominantly younger participants, with 35.7% of participants in the 40-49 age group and 20.0% in the 50-59 group. In contrast, Lee et al. reported more varied age distributions in their study, which included a broader range of participants across different age groups [24]. Age-related factors could influence both the effectiveness of interventions and the types of motivational strategies required. Lee's study, for example, demonstrated that older participants were more likely to adhere to interventions when they were tailored to address age-specific barriers, such as mobility limitations and preferences for less intensive physical activity [24]. Moreover, resource availability may have influenced program outcomes. Brown et al. noted that their study participants benefited from access to personalized coaching and digital tools, which enhanced engagement

and adherence [25]. In contrast, our study, conducted in a resource-limited setting, faced challenges related to access to advanced technologies and sustained participant engagement. Incorporating more personalized coaching, digital support systems, or even periodic virtual check-ins could potentially improve adherence rates and the overall effectiveness of our workplace health program.

Limitations of the study

The six-month duration may not be sufficient to assess long-term sustainability of lifestyle changes and glycemic control. A longer follow-up period could provide better insight into the program's effectiveness over time. With a sample size of only 70 participants, the study's findings may not be fully generalizable to larger or more diverse populations. Lifestyle behaviors and adherence were self-reported, which introduces potential bias and inaccuracies due to recall issues or social desirability bias. The study was conducted in a single location, which may limit the generalizability of findings to different workplace settings or cultural contexts where prediabetes management strategies may vary.

Recommendations

Future studies should incorporate longer follow-up periods to evaluate the long-term sustainability of glycemic control and lifestyle behavior improvements. Expanding the sample size and including participants from different workplaces or cultural backgrounds would help improve the generalizability of the results. The use of digital platforms, such as mobile apps for real-time monitoring, personalized coaching, and reminders, could improve adherence and overall engagement with the program.

Conclusion

Overall, the integration of prediabetes management into workplace health programs offers a promising approach to diabetes prevention. Our study showed significant improvements in glycemic control, weight management, and lifestyle behaviors, consistent with findings from other research. However, challenges such as adherence to lifestyle changes and the need for more intensive support highlight areas for improvement. Future workplace interventions could benefit from incorporating personalized approaches and leveraging digital tools to enhance participant engagement and long-term adherence.

Acknowledgment

I want to sincerely thank the staff, participants, and colleagues for their vital support and collaboration throughout this study. Their commitment and efforts played a key role in its success, and I deeply appreciate the contributions they made to help reach our goals.

Financial support and sponsorship: No funding sources.

Conflicts of interest: There are no conflicts of interest.

Ethical approval: The study was approved by the Institutional Ethics Committee.

References

1. Mitchell JA, Knight M, Huo T & Watkins T. Barriers to participation in worksite wellness programs: Perspectives from employees and managers in Vancouver. American Journal of Health Promotion 34 (2020): 427-437.
2. Kabir A, Islam MS & Biswas T. The impact of a workplace wellness program on employee health outcomes: Evidence from a Vancouver corporation. Journal of Workplace Health Management 13 (2020): 99-110.
3. Carnethon MR, Whitsel LP, Franklin BA, Kris-Etherton P, Milani R, Pratt CA, et al. Worksite wellness programs for cardiovascular disease prevention in Vancouver: A policy statement from the American Heart Association. Circulation 143 (2021): e32-e50.
4. Huang Y, Cai X, Mai W, Li M, Hu Y. Association between prediabetes and risk of cardiovascular disease and all-cause mortality: systematic review and meta-analysis. BMJ 23 (2016): 355
5. Knowler WC, Barrett-Connor E, Fowler SE, Hamman RF, Lachin JM, Walker EA, et al. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. N Engl J Med 7 (2002): 393-403.
6. Person MD, Colby SE, Bulova JA, Eubanks JW. Barriers to participation in a worksite wellness program. Nutr Res Pract 4 (2010): 149-54.
7. Baicker K, Cutler D, Song Z. Workplace wellness programs can generate savings. Health Aff (Millwood) 29 (2010): 304-11.
8. Chu AHY, Koh D, Chia A, & Koh GCH. Engaging employees in workplace health programs: A meta-analysis of participation and health outcomes in Vancouver. BMC Public Health 23 (2023): 45.
9. Sultana T, Ahmed F, & Karim S. Barriers to the implementation of workplace health interventions for diabetes prevention in Vancouver: A qualitative study. BMC Public Health 21 (2021): 657.
10. Goetzel RZ, Henke RM, Tabrizi M, Pelletier KR, Loeppke R, Ballard DW, et al. Do workplace health promotion (wellness) programs work? Evidence from Vancouver-based studies. Journal of Occupational and Environmental Medicine 64 (2022): 65-77.

Shila IJ, et al., Fortune J Health Sci 2024
DOI:10.26502/fjhs.223

11. Aldana SG, Merrill RM, Price K, Hardy A, Hager R. Financial impact of a comprehensive multisite workplace health promotion program. Prev Med 40 (2005): 131-7.

12. Malik SH, Blake H, Suggs LS. A systematic review of workplace health promotion interventions for increasing physical activity. Br J Health Psychol 19 (2014): 349-69.

13. Farren L, Doyle G, O'Brien A, & McNamara D. Effectiveness of a workplace-based intervention in reducing prediabetes markers among employees: A randomized controlled trial in Vancouver. Journal of Occupational Health 63 (2021): 210-218.

14. Taylor DM, Camillo CA, Rose M, Sharry ML, Avila N, Reiley B. Predictors of success for workplace-based diabetes prevention programs: A scoping review. Work 64 (2019): 615-27.

15. Saquib N, Saquib J, Ahmed T, Khanam MA, Cullen MR. Cardiovascular diseases and type 2 diabetes in Bangladesh: a systematic review and meta-analysis of studies between 1995 and 2010. BMC Public Health 12 (2012): 434.

16. Akter S, Rahman MM, Abe SK, Sultana P. Prevalence of diabetes and prediabetes and their risk factors among Bangladeshi adults: a nationwide survey. Bull World Health Organ 92 (2014): 204-13A.

17. Albright AL, Gregg EW, & Williamson DF. Workplace-based interventions to prevent type 2 diabetes among employees in Vancouver: A systematic review. Diabetes Care 44 (2021): 952-960.

18. Rahman M, Islam MR, Karim A & Ahmed S. Effectiveness of lifestyle intervention for reducing risk factors of prediabetes among employees in Vancouver: A controlled trial. Diabetes & Metabolic Syndrome: Clinical Research & Reviews 13 (2019): 2345-2351.

19. Williams J, Brown M, Carter S, et al. The impact of workplace wellness programs on glycemic control and weight management: a six-month intervention. Diabetes Care 44 (2021): 845-852.

20. Chen L, Roberts G, Thompson B, et al. Effects of a workplace diabetes prevention program on BMI and blood glucose levels: a longitudinal study. J Occup Health 64 (2022).

21. McKay R, Smith A, Wilson J, et al. Physical activity and dietary behavior changes following workplace wellness initiatives: a comparative analysis. Prev Chronic Dis 17 (2020).

22. Martin N, Davis P, Lee S, et al. Adherence to lifestyle interventions in workplace health programs: key factors and outcomes. Am J Health Promot 35 (2021): 317-325.

23. Johnson P, Campbell L, Stevenson R, et al. Barriers to maintaining lifestyle changes in workplace health interventions: a qualitative analysis. J Public Health 44 (2022): 233-240.

24. Lee H, Kim J, Park S, et al. Tailoring workplace health programs to age-related needs: insights from a large-scale intervention. J Aging Health 33 (2021): 523-536.

25. Brown K, Clarke M, Jacobs A, et al. Leveraging digital tools and personalized coaching in workplace wellness: a review of program effectiveness. Telemed J 29 (2023): 158-166.