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MODIFIABLE RISK FACTORS AND THEIR RELATIONSHIP WITH TYPE 2 DIABETES MELLITUS AMONG FEMALE UNIVERSITY EMPLOYEES IN SOUTH-EAST DELHI - A CROSS-SECTIONAL ANALYSIS

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Abstract

Background:

Type 2 Diabetes Mellitus (T2DM) is a prevalent non-communicable disease (NCDs) with significant public health implications. These conditions are influenced by modifiable risk factors such as lifestyle behaviours, physical activity, diet, and psychosocial stress. Female employees, particularly in an academic environment, are a unique demographic due to their dual roles in professional as well as personal life, which may increase their susceptibility to these conditions. Therefore, this study was conducted as a Cross-Sectional Study to assess the modifiable risk factors and their association with type 2 diabetes mellitus among female employees of a university in southeast Delhi.

Objectives:

This study aims to evaluate the prevalence of T_2DM among female employees and identify their association with modifiable risk factors. It also explores psychosocial factors such as sleep quality and mental health to provide a holistic understanding of the determinants of these conditions.

Methods: A cross-sectional survey was conducted among 257 female employees at Jamia Hamdard University. Demographic and behavioural factors were collected on a questionnaire, the World Health

Organization (WHO) STEPS questionnaire. Data on modifiable risk factors (e.g., physical activity, dietary habits, BMI, and smoking status), sleep quality (PSQI scores), and mental health (GHQ scores) were collected through questionnaires and anthropometric measurements. Intergroup comparisons were performed to evaluate the associations between these modifiable risk factors, T2DM.

Results: In this cross-sectional study involving 257 female employees of a university in Southeast Delhi, the participants had a mean age of 40.1 ± 7.69 years (range 30–66). Most were highly educated, predominantly Muslim (61.1%), and married (76.3%). Regular health checkups were common, with 83.7% reporting blood sugar monitoring. Despite this 10.9% had been diagnosed with T_2DM, respectively, with 7.4% receiving these diagnoses in the past year. Lifestyle behaviours varied significantly between groups. Tobacco use was not associated with diabetes. Fruit consumption was significantly lower among diabetics (P=0.033), and they also engaged in less physical activity, including moderate-intensity exercise (P=0.017) and walking or cycling (P=0.002). Poor sleep quality was significantly linked to T_2DM (P=0.003), while psychological distress was not significant. Medication use was substantially higher among diabetics (50%) compared to non-diabetic counterparts (P<0.001).

Conclusion: This study highlights the substantial burden of type 2 diabetes mellitus (T_2DM) among female employees of Jamia Hamdard University, underscoring the critical role of modifiable risk factors in the development and management of these conditions. Poor sleep quality and psychological distress, as evidenced by higher PSQI and GHQ scores, were strongly associated with the prevalence of T_2DM. Public health strategies tailored to the demographic and cultural context can effectively reduce the burden of non-communicable diseases.

Keywords: Type 2 diabetes mellitus, WHO STEPS, female employees, modifiable risk factors

I. Introduction

Diabetes mellitus is caused by a complex interaction of genetic and environmental factors(Kumar et al. 2016). Moreover, the stress of driving and exposure to atmospheric pollutants as risks can influence their performance, and cause sickness and absenteeism, thereby posing a great financial burden to society(Cho et al. 2018). According to the latest International Diabetes Federation (IDF) report, the global prevalence of T2DM in adults was 536.6 million people (10.5%) in 2021, and there will be 783.2 million people (12.2%) living with diabetes worldwide by 2045(Sun et al. 2022). The 2019–2020 National Family Health Survey (NFHS-5) reported a prevalence of diabetes mellitus of 17.9% in men and 16.3% among women(Al-Salameh et al. 2019). The cardiovascular consequences of diabetes differ in men and women, with women having greater cardiovascular sequelae(Al-Salameh et al. 2019). Girls and

women have lower physical activity and more sedentary time than boys and men (Virani et al. 2021). A secondary analysis of global data sets tested the relationships between physical activity and diabetes prevalence by sex. In men, the relationship between increased obesity prevalence and increased diabetes was inconsistent. In women, there was a stronger relationship between obesity and diabetes than in men, but certain regions did not follow this pattern(Alkaf et al. 2021). Women, particularly those engaged in professional settings, often experience unique stressors related to work-life balance, sedentary lifestyles, and dietary patterns, which may further elevate their risk of developing diabetes. In university settings, female employees, including faculty members and administrative staff, are exposed to prolonged sitting, irregular meal patterns, and high occupational stress, making them a vulnerable group to hypertension and its associated complications (Aravindalochanan et al. 2014). Despite extensive research on diabetes in the general population, limited studies focus on female university employees, especially in the Southeast Delhi region. Understanding the prevalence of modifiable risk factors among this group is essential for developing targeted interventions and workplace health policies(Ong et al. 2023). Therefore, this cross-sectional study aims to assess the association between modifiable risk factors and diabetes among female employees of a university in Southeast Delhi. By identifying key determinants, this study will provide valuable insights into preventive strategies that can be implemented to reduce diabetes-related health risks in this population(Dandona et al. 2024).

II. Materials and Methods

Study area

This was a cross-sectional study carried out at Jamia Hamdard, Hamdard Nagar. It is located in the prime location of southeast Delhi. Most of the employees and students here come from the Middle Class and are inhabitants of Delhi and the nearby states like U.P., Bihar, and also from far away states like Kashmir. The main campus of the university has a female employee strength of around 500.

Study Design and Period

An institutional-based cross-sectional study was conducted among 257 female employees of Jamia Hamdard University, New Delhi. The study participants, aged 30 years and above, and employed for at least six months, were included. Individuals unwilling to provide consent were excluded from the study. A single population proportion formula was used to calculate the

sample size using Open Epi 3.1, based on the National Family Health Survey-5 (NFHS-5) data. The prevalence of high blood sugar among urban women in NCT Delhi was reported as 4.2%. Using a 95% confidence level (Zα/2=1.96 Z_{\alpha/2} = 1.96 Zα/2=1.96), a 2.5% margin of error, and accounting for a 10% non-response rate, the final sample size was 257 participants. The sample was selected using a stratified random sampling technique, proportionate to the size of their respective departments, using the official payroll roster as the sampling frame. Female employees fulfilling the inclusion and exclusion criteria were invited to participate. Data collection was conducted over six months.

Data collection and tools (questionnaire)

Face-to-face interviews using a structured questionnaire were conducted to collect the data.

The WHO STEPS questionnaire was used to collect data on demographics and lifestyle factors. It includes questions on demographics, lifestyle factors (such as tobacco, alcohol use, etc), medical history, and physical measurement (height, weight, waist, and hip circumference), Weight was measured using a Health genie digital weighing machine. Height was measured using a height meter. Waist and hip circumference were measured using a measuring tape.

General Health Questionnaire (GHQ)

This is a screening tool that detects psychological distress and mental health problems. It consists of 12 items that ask about the presence of symptoms such as anxiety, depression, insomnia, and social dysfunction in the past few weeks.

Pittsburgh Sleep Quality Index (PSQI)

The PSQI is a questionnaire designed to assess the overall sleep quality of individuals. It consists of 19 self-reported items, each belonging to one of seven subcategories, which include subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction.

III. Statistical Analysis

Data were double-entered into Epi Data version 3.1 for initial cleaning and coding before being transferred to SPSS version 28 for analysis. The dataset was checked for completeness, missing values, and outliers. Descriptive statistics such as proportions, frequencies, means, and standard deviations were used to summarize the prevalence of hypertension, Type 2 Diabetes Mellitus (T2DM), and their co-occurrence. A binary logistic regression model was employed to identify

factors associated with T2DM, and their co-occurrence. Variables with a p-value of <0.25 in the bivariate analysis were considered for multivariable analysis to control for potential confounders. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were calculated to quantify associations, and statistical significance was set at $p < 0.05$.

Results:

Sociodemographic characteristics and modifiable risk factors associated with T2DM among study participants

Of the total 257 participants who consented to participate, demographically, participants had a mean age of 40.1 ± 7.69 years, with a range of 30 to 66 years. Most were highly educated, predominantly Muslim (61.1%), and married (76.3%).

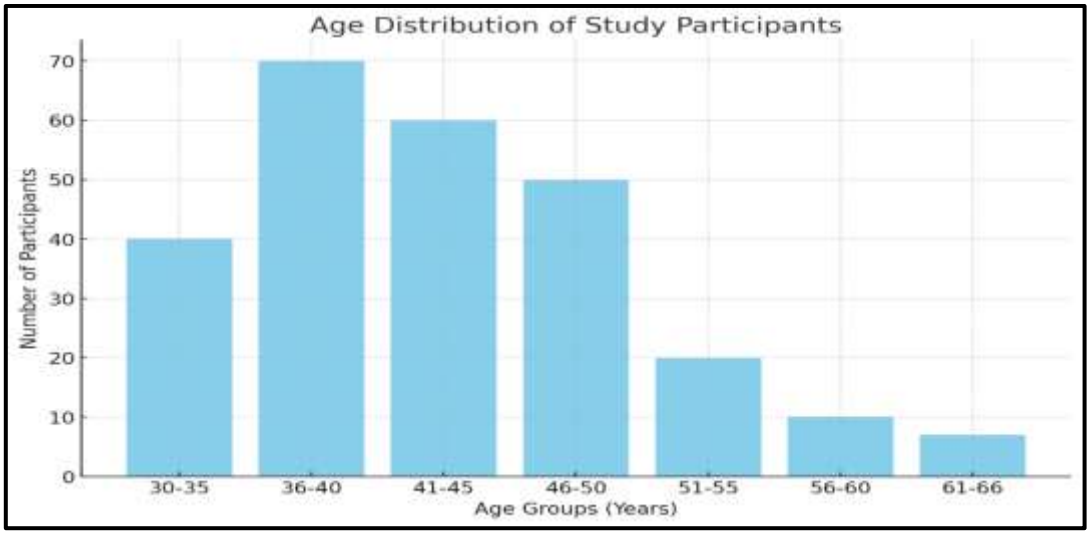

Fig No :1 Distribution of study participants according to age

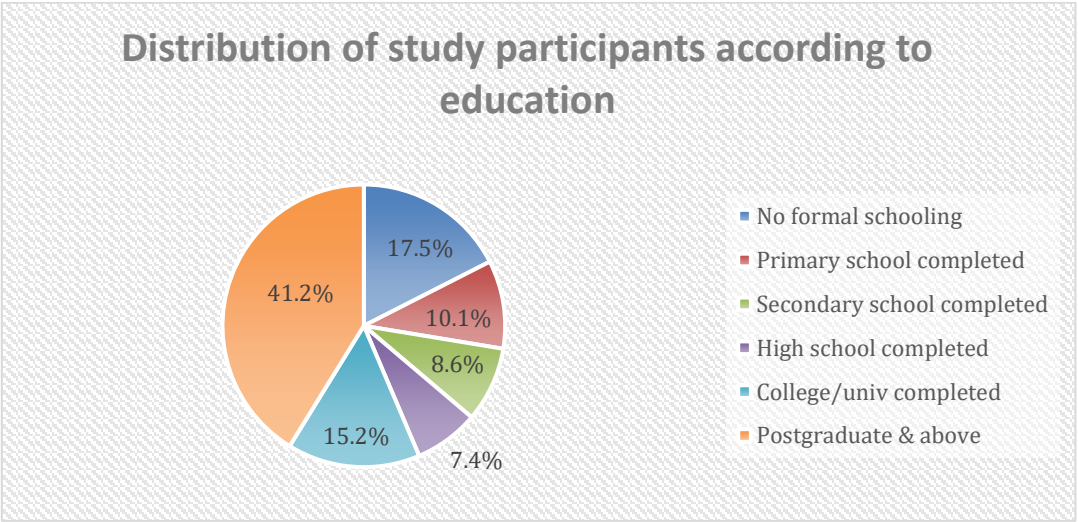

Fig No 2: Distribution of study participants according to education

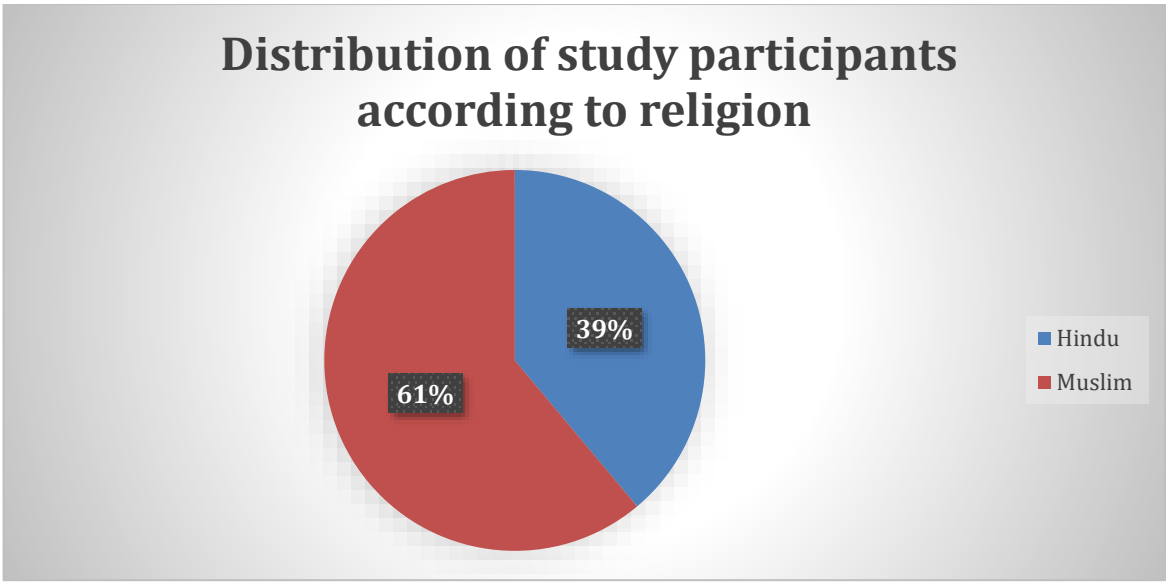

Fig No: 3 Distribution of study participants according to religion

Regular health checkups were common, with their blood sugar levels checked. 10.9% were informed they had diabetes, with 7.4%, respectively, being diagnosed in the past year. Lifestyle factors revealed a prevalence of tobacco use, which was not significantly associated with diabetes (P=0.655). Alcohol consumption was rare (1.2%), showing no significant differences across groups. Diabetics consumed fruits on fewer days than non-diabetics (3.21 vs. 4.27 days; P=0.033), though vegetable consumption did not differ significantly. Physical inactivity was a notable concern, with diabetics being less likely to engage in moderate-intensity activities (6.6% vs. 21.4%; P=0.017) and walking or cycling on fewer days (4.82 vs. 5.66 days; P=0.002).diabetics reported poorer sleep quality (P=0.003), though no significant psychological distress was observed (P=0.191). Medication use was significantly higher among diabetics (50%), compared to none among non-diabetic participants (P<0.001).

Variable	Diabetic	Normoglycemic	Significance (p-value)
Tobacco Use (%)	7.1%	5.2%	NS (0.655)
Age of Tobacco Use Initiation (Years)	40.0	Earlier	NS (0.068)
Tobacco Use Duration (Years)	7.00	9.25	NS (>0.05)
Alcohol Use (%)	1.3%	0%	NS (>0.05)
Fruit Consumption (Days/Week)	3.21	4.27	**Significant (0.033)**
Fruit Servings/Day	1.10	1.32	NS (>0.05)

Vegetable Consumption (Days/Week)	5.5	6.0	NS (>0.05)
Vegetable Servings/Day	1.89	1.53	NS (>0.05)
Vigorous-Intensity Activity at Work (%)	17.9%	32.2%	NS (>0.05)
Moderate-Intensity Activity at Work (%)	6.6%	21.4%	**Significant (0.017)**
Walking or Cycling for ≥10 Minutes (%)	100%	81.2%	**Significant (0.006)**
Walking or Cycling (Days/Week)	4.82	5.66	**Significant (0.002)**
Medication Use (%)	50.0%	0%	**Significant (<0.001)**
Pregnancy Occurrence (%)	0%	1.7%	NS (>0.05)

The prevalence of T2DM

Among the participants (N=257), the majority reported having undergone health monitoring for blood sugar (**83.7%**, n=215) at least once in their lifetime, reflecting high levels of healthcare access and awareness within the population. The overall prevalence of **19.1%** (n=49) being newly diagnosed in the past 12 months and **6.2%** (n=16) prevalence of diabetes mellitus (T2DM) was **10.9%** (n=28), based on self-reported diagnoses by healthcare providers. Among these, **7.4%** (n=19) were newly diagnosed within the past year, while **3.5%** (n=9) had a prior diagnosis. These findings highlight significant levels of health monitoring, yet also reveal gaps in early detection, as evidenced by the considerable proportion of undiagnosed diabetes (**7.4%**) cases identified during the study.

Variable	Frequency (n)	Percentage (%)
Health Monitoring		
Blood Sugar Monitoring (ever)	215	83.7%
Diabetes Mellitus (T2DM)		
Diabetes Mellitus (Total)	28	10.9%
Newly Diagnosed (past 12 months)	19	7.4%
Previously Known Cases	9	3.5%

IV. Discussion

Age Distribution and T2DM Risk; The study's sample had a mean age of 40.10 years, indicating that the population is primarily middle-aged, a critical period for the onset of Type 2 diabetes and other chronic diseases. A study conducted by (Sidenur and Shankar 2023) investigated the relationship between age, lifestyle factors, and the prevalence of Type 2 diabetes among employees of a university. The mean age of participants was 42.3 years, with an age range of 28 to 65 years. The study found that female university employees, especially those in their 40s and 50s, had a higher risk of developing Type 2 diabetes compared to younger participants. The study concluded that middle-aged female employees in university settings often face unique stressors related to balancing professional and personal responsibilities, which may exacerbate the risk of chronic diseases. The authors recommended targeted health promotion programs in university settings, focusing on stress management, physical activity, and healthy eating, to reduce the burden of these conditions(Mofatteh 2020).

Educational Attainment; The sample reflects a wide educational disparity, with 41.2% having postgraduate education or higher, while 17.5% had no formal schooling. The high level of education in this population suggests that health awareness and access to health-related information may be better, although the disparity may contribute to varying health outcomes. This is consistent with the findings of (Montez and Cheng 2022)**.** which reported similar educational distributions in urban health studies ("Figures from Gupta et al. (2021) Showing the Proportions of Recommended... | Download Scientific Diagram," n.d.).

Religious Composition; The Majority of the participants (61.1%) belonged Muslim to the Muslim community from this the inference can't be drawn that type 2 diabetes mellitus is more prevalent in Muslims. It was purely a chance that more Muslim females employed Jamia Hamdard University during the study period.

Marital Status; The high percentage of married participants (76.3%) may influence the prevalence of diabetes, as previous research (Singh et al., 2020;) (Verma et al., 2018) has shown that marital status can affect stress levels and, consequently, the risk of chronic diseases. Married women may face shared household stressors, while widowed or divorced individuals may experience heightened psychosocial challenges, influencing their health outcomes (Zhao et al. 2024).

Diabetes Prevalence and Health Awareness.

In this study, 10.9% of participants reported being told by a doctor or healthcare worker that they had diabetes. This finding aligns with studies from other regions, such as a study by (Chatterjee, Khunti, and Davies 2017)which found that approximately 11% of the population in India had been diagnosed with diabetes by healthcare providers. Similarly, a study by (Kim et al. 2020), urban employees in India also reported a low percentage of diabetes diagnosis awareness, highlighting challenges in early detection and healthcare access. This underlines the need for improved awareness, screening, and early intervention programs in both urban and rural settings to address the growing burden of diabetes. These findings highlight the importance of addressing modifiable risk factors specific to female employees in university settings(Sahadevan et al., n.d.).

The majority (83.7%) of participants reported having their blood sugar measured by a healthcare professional, indicating high awareness and access to health monitoring within this population A study in, New Delhi ("(PDF) Knowledge and Awareness About Diabetes Mellitus Among Urban and Rural Population Attending a Tertiary Care Hospital in Haryana" 2025) found that 78% of universities employees had undergone blood sugar testing, largely due to health awareness programs. Similarly, a study in Chandigarh ("Singh et al., 2019 | Association for Contextual Behavioral Science," n.d.)**)** showed that 85% of female university employees had been tested, citing workplace wellness programs as a key factor. These findings align with the high rates of blood sugar testing in your study, suggesting that university environments promote health-conscious behaviours. Educational institutions often provide easy access to health screenings, fostering regular check-ups.

7.4% of study participants were diagnosed with diabetes in the past 12 months aligns with) data, which reported a prevalence of 6.5% among urban women. This slightly higher rate may reflect the sedentary lifestyle and occupational patterns of university employees. The result highlights the need for targeted interventions addressing modifiable risk factors in such high-risk populations.

Diabetes Tobacco Use; tobacco use was slightly higher among diabetic participants (7.1%) compared to non-diabetics (5.2%), this difference was not statistically significant (P = 0.655). Despite the observed trend, the lack of statistical significance implies that the difference may be

due to random variation rather than a meaningful association. The findings mirror the inconclusive results of previous studies regarding the relationship between diabetes and tobacco use. While some studies, like that of (Willi et al. 2007) have identified smoking as a risk factor for the development of type 2 diabetes, other research has suggested that individuals with diabetes may have similar or lower smoking rates than the general population due to increased health awareness or cessation efforts (Campagna et al. 2019).

An alarming finding in the study was that all tobacco users, regardless of diabetes status, reported daily tobacco use. Daily users were non-diabetic, and only 2 were diabetic. This pattern indicates that daily tobacco use was present in diabetic and non-diabetic participants, though the number of diabetic tobacco users was notably low. This suggests that while daily tobacco use is prevalent among some, it may not be significantly associated with the presence of diabetes in this sample population. The study found no significant difference in the age of initiation of tobacco use between diabetic and non-diabetic participants. Non-diabetics began using tobacco at a mean age of 29.5 years, while diabetics started at 40.0 years, but the small number of diabetic smokers (n = 2) limits the reliability of this finding. Although early initiation of smoking is associated with a higher risk of chronic health problems, including cardiovascular disease and type 2 diabetes (Campagna et al. 2019) the lack of a significant difference here suggests that the age of initiation may not vary substantially between diabetic and non-diabetic populations in this sample.

The analysis indicates that the duration of tobacco use does not significantly differ between diabetic and normoglycemic participants ($p = 0.688$). Diabetic participants had a mean of 7.00 years, compared to 9.25 years in normoglycemic participants. Overall, the duration of tobacco use appears unrelated to diabetes status in this sample.

Regarding tobacco type, the study found no significant differences in the duration or type of tobacco use between participants with and without diabetes. Most participants, regardless of their diabetes status, fell into the "Nil" category, indicating no tobacco use. A small portion, approximately 5.06%, reported using tobacco, categorized as "Others," while none reported using manufactured cigarettes, hand-rolled cigarettes, pipes, cigars, cheroots, or cigarillos. This limited tobacco use across the sample suggests that, within this population, tobacco may not be a major modifiable risk factor for diabetes.

Alcohol consumption

The study found no significant association between alcohol consumption diabetes status (p=0.999) in this population, likely due to the very low prevalence of alcohol use. Only 1.3% of non-diabetic participants reported alcohol use, while none of the diabetic participants did, suggesting a potentially higher level of health awareness or adherence to medical advice among diabetics, as alcohol can impact glycemic control and increase hypoglycaemia risk **.** These findings are consistent with other research Overall, alcohol does not appear to be a key modifiable factor associated with diabetes in this sample("American Journal of Hypertension | Oxford Academic," n.d.).

Dietary Habits – Fruits and Vegetables; According to the Indian Council of Medical Research, a moderately active adult man should consume 400 gm of fruits and vegetables per day. WHO recommends that an individual should consume five servings of fruits and vegetables per day (1 fresh serving = 80gm) Intergroup comparison of the mean number of days in a week when fruits were consumed was done using Mann Whitney U test. However, a significant difference was found between diabetic and non-diabetic participants (P = 0.033, S), with diabetics consuming fruit fewer days (3.21) compared to non-diabetics (4.27). This suggests that diabetes status may influence fruit consumption patterns.

No significant difference in daily fruit servings between diabetic and non-diabetic participants (P = 0.240, NS), with diabetics consuming an average of 1.10 servings and non-diabetics 1.32 servings. Both conditions did not appear to significantly impact fruit consumption per day.

Mann Whitney U test, the mean number of days in a week, there was no significant difference in weekly vegetable consumption between diabetic and non-diabetic participants (P = 0.084, NS), with diabetics eating vegetables on average 5.5 days and non-diabetics 6.0 days. diabetes status did not appear to significantly affect vegetable consumption frequency. no significant difference was observed between diabetic and non-diabetic participants (P = 0.430, NS), with diabetics consuming 1.89 servings and non-diabetics 1.53 servings per day. Both hypertension and diabetes status did not significantly affect the number of vegetable servings consumed daily.

Vegetables, particularly non-starchy varieties, are a rich source of fibre, vitamins, and minerals, and have been shown to improve glycemic control and reduce cardiovascular risk. While this study found no significant differences in vegetable consumption, it also noted that both groups

fell short of the recommended intake of five servings of fruits and vegetables per day("World Health Day 2020 - PAHO/WHO | Pan American Health Organization," n.d.). Future interventions should aim to increase vegetable consumption across the board.

Physical Activity

The findings of this study highlight several noteworthy patterns concerning the involvement in physical activity among female university employees, focusing on the impact of diabetes status on work-related and recreational physical activity.

The analysis of vigorous work-related physical activity revealed no significant difference in the involvement of vigorous-intensity activity between no significant difference was found between diabetic and non-diabetic participants (P = 0.131, NS), with 17.9% of diabetics and 32.2% of non-diabetics engaging in vigorous activity. A similar result was reported in other studies by (Singh, Shankar, and Singh 2017).diabetes status did not significantly affect participation in vigorous-intensity activity at work.

In this study, intergroup comparison of the mean number of days in a week with vigorous activities at work did not reflect a statistically significant difference among healthy, diabetic study participants. Specifically, there was no significant difference between diabetic and non-diabetic participants (P = 0.131, NS), regarding their involvement in vigorous-intensity activity at work. Diabetes status did not significantly impact the frequency of such activities.

An intergroup comparison of the mean number of minutes spent on vigorous activities at work each day did not reveal a statistically significant difference among healthy, diabetic study participants. Specifically, there was no significant difference between diabetic and non-diabetic participants

For **moderate-intensity physical activity** at work, data shows no significant difference in moderate-intensity activity at work between diabetic individuals were significantly less likely to engage in moderate-intensity activity compared to non-diabetic individuals (P=0.017), with only 6.6% of diabetics reporting such activity, while 21.4% of non-diabetics did. This suggests a notable disparity in physical activity levels between diabetics and non-diabetics in the workplace, which could have potential health implications. there is a significant difference between diabetic and non-diabetic participants, with diabetics engaging in fewer days of moderate-intensity activities at work (P=0.042). significant difference was found between diabetic and non-diabetic participants (P=0.045), with diabetics spending significantly less time

on moderate-intensity activities at work compared to non-diabetics. This suggests that diabetes may be associated with lower levels of physical activity in the workplace.

When examining **walking or cycling for at least 10 minutes per day** significant difference was observed between diabetic and non-diabetic participants (P=0.006), with all diabetic participants engaging in walking or cycling for at least 10 minutes, while 81.2% of non-diabetic participants did. This suggests that diabetes may encourage more consistent physical activity compared to non-diabetes.

In this study, no significant difference in the number of days per week spent walking or cycling between there is a significant difference between diabetic and non-diabetic participants (P=0.002), with diabetics engaging in fewer days of walking or cycling per week compared to non-diabetics (4.82 vs. 5.66 days). This suggests that diabetes is associated with fewer days of physical activity.

There is no significant difference in the daily minutes spent walking or cycling. No significant difference is found between diabetic and non-diabetic participants (P=0.303), with diabetics spending fewer minutes (53.2 vs. 64.8) on walking or cycling. Diabetes do not have a significant impact on daily walking or cycling duration.

In terms of **vigorous-intensity sports or recreational activities,** neither there was no significant difference in engaging in vigorous-intensity activities for at least 10 minutes a day between no significant difference is found between diabetic and non-diabetic participants (P=0.999), with both groups showing similar low levels of participation (7.1% vs. 6.6%). This suggests that neither nor diabetes is significantly associated with engaging in vigorous-intensity activities

There was no significant difference in the number of days per week spent on vigorous-intensity activities there is no significant difference between diabetic and non-diabetic participants (P=0.625), with diabetics engaging in 4.5 days and non-diabetics engaging in 5.0 days. This indicates that neither nor diabetes significantly affects the frequency of vigorous-intensity activities.

Intergroup comparison

There is no significant difference in the daily minutes spent on vigorous-intensity activities no significant difference is found between diabetic and non-diabetic participants (P=0.280), with

diabetics spending less time (22.5 minutes) compared to non-diabetics (36.3 minutes). This suggests that neither hypertension nor diabetes significantly influences the time spent on vigorous-intensity activities

Finally, in relation to **moderate-intensity sports, exercise, or recreational activities,** the study found that engagement was generally low across all groups no significant difference no significant difference is found between diabetic and non-diabetic participants (P=0.615), with none of the diabetic participants engaging in such activities compared to 4.8% of non-diabetics. This indicates that diabetes does not significantly affect participation in moderate-intensity activities.

No significant difference in the number of days per week spent on moderate-intensity sports or recreational activities for diabetes, no diabetic participants reported engaging in moderate-intensity activities, while 4.8% of non-diabetic participants engaged in such activities, with a mean of 3.27 days. This suggests that diabetes have minimal influence on the frequency of moderate-intensity activity.

There is no significant difference in the number of minutes spent on moderate-intensity sports, exercise, or recreational activities in diabetic participants, none reported engaging in moderate-intensity activities, while 4.8% of non-diabetic participants spent an average of 40.9 minutes. This suggests that diabetes is associated with a complete lack of participation in such activities. A similar result was reported by other studies by (Shikha Singh et al. 2017, Fuchs et al. 2020), and (Huang et al. 2021).

The analysis of pregnancy occurrence among the study population revealed no significant differences pattern was observed among diabetic and non-diabetic individuals, with no diabetic participants reporting pregnancy and only 1.7% of non-diabetic participants experiencing pregnancy (P=0.999). These findings indicate that diabetes has no influence on the occurrence of pregnancy within this population. Diabetes status was not significantly associated with pregnancy occurrence, aligning with findings from studies such as those by (Bowers et al. 2018) and (Chen et al. 2019).

This study found a significant difference in medication use pattern was observed among diabetic and non-diabetic participants, with 50% of diabetics using medication, while none of the non-diabetics reported taking medications (P < 0.001). These findings indicate a strong association with diabetes status and the increased likelihood of medication use among affected individuals.

the high medication usage rate among diabetic participants supports findings from studies by ("American Journal of Hypertension | Oxford Academic," n.d.)

This study found that Diabetic participants showed significantly higher PSQI scores than non-diabetics (P = 0.003), pointing to poorer sleep quality in this group as well. However, there was no significant difference in GHQ scores between diabetic and non-diabetic individuals (P = 0.191), suggesting that diabetes primarily impacts sleep quality rather than psychological distress.

While diabetic participants in this study also exhibited poorer sleep quality (higher PSQI scores) than non-diabetics, there was no significant difference in GHQ scores, suggesting that diabetes primarily affects sleep quality rather than psychological health. This finding is in line with research by (Abbott, Knutson, and Zee 2018)

Future research should aim to explore these complex relationships in more depth, with larger and more diverse samples. Longitudinal studies that examine the cumulative effects of lifestyle factors on diabetes management, and overall health outcomes will be particularly valuable. By integrating lifestyle interventions with targeted strategies to address mental health and sleep quality, healthcare providers can develop more effective, personalized management plans for individuals with hypertension and diabetes, ultimately promoting better health outcomes and reducing health disparities.

V. Conclusion

The study titled *"A Cross-Sectional Study to Assess the Modifiable Risk Factors and Their Association with Type 2 Diabetes Mellitus Among Female Employees of a University in Southeast Delhi"* provides valuable insights into the prevalence, associated factors, and lifestyle behaviours influencing two major non-communicable diseases, Type 2 Diabetes Mellitus (T2DM), among female university employees.

Key findings indicate that both conditions are significantly influenced by modifiable risk factors, including tobacco use, physical inactivity, and dietary habits. Although tobacco use was relatively low in the study population, However, the duration of tobacco use and its intensity were not significantly related to diabetes. Interestingly, diabetes was associated with reduced fruit consumption and lower participation in moderate-intensity activities, underscoring the need for targeted dietary and physical activity interventions.

Diabetes significantly impacted sleep quality, as evidenced by higher PSQI scores among affected individuals. diabetes was not significantly associated with psychological health. These findings emphasize the interplay between physical and mental health in managing these chronic conditions.

The study revealed significant disparities in medication use, with over half of diabetic participants requiring treatment, highlighting the clinical burden of these diseases. Conversely, no significant differences were found in pregnancy occurrence, vigorous-intensity activities, or the number of daily servings of fruits and vegetables between affected and unaffected groups. However, diabetic participants demonstrated a higher likelihood of engaging in walking or cycling for at least 10 minutes daily, possibly reflecting compensatory behaviours following a diagnosis.

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