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EFFECT OF DIABETES (TYPE-II) ON VISUAL ABILITY

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ABSTRACT

In this study, we aim to assess whether visual acuity impairment is an independent predictor of type II diabetes in both diabetic and non-diabetic teachers. This research constitutes a follow-up study involving a cohort of 100 teachers aged 30 years or older who have been diagnosed with type II diabetes or are non-diabetic. The evaluation of visual acuity was conducted by the researcher using a teacher visual ability information questionnaire. The purpose of this assessment was to gauge the participants' visual capabilities accurately. The study findings indicate a significant association between diabetes and the visual ability of teachers. This suggests that diabetes has a substantial impact on the visual acuity of teachers, irrespective of whether they have a prior diabetes diagnosis or not.

INTRODUCTION:

Visual impairment is a frequent outcome of type II diabetes, impacting approximately 4% to 16% of both diabetic and non-diabetic teachers. The widespread prevalence of type II diabetes globally has contributed to a rise in micro vascular and macro vascular complications associated with vision deterioration. Between 1990 and 2010, the worldwide incidence of visual impairment resulting from diabetic retinopathy surged by 64% for moderate to severe visual impairment and 27% for complete blindness. Present clinical recommendations advise annual or biannual screening of individuals with diabetes to mitigate or postpone the development of vision-threatening ailments.

Teachers who experience both diabetes and visual impairment may find themselves caught in a challenging cycle of declining health. Visual impairment significantly hampers their ability to engage in self-care activities, such as preparing nutritious meals, exercising regularly, and administering insulin and medications essential for maintaining stable blood glucose levels. Furthermore, previous research has indicated that visual impairment can exacerbate the detrimental effects of diabetes. Individuals living with both diabetes and visual impairment face a higher risk than those with normal vision of encountering long-term diabetes complications, functional limitations, accidents, mental distress, loneliness, and social disadvantages, including unemployment and reduced access to healthcare services. Additionally, diabetes and its associated complications can impede individuals' capacity to adapt to and manage their vision loss.

Meta-analytic reviews have revealed that the presence of type II diabetes doubles the risk of premature mortality from all causes and cardiovascular diseases. Although conditions like hyperglycemia and hypertension have been identified as independent predictors of mortality in type II diabetes patients, the potential role of visual impairment as a mortality risk factor remains relatively unexplored. The existing studies on this topic have generally failed to control for critical diabetes-related factors, such as diabetes status and coexisting chronic conditions. Furthermore, these earlier studies have primarily focused on patients with visual impairment resulting from diabetic retinopathy or individuals who are blind due to early onset type I diabetes—groups typically characterized by long durations of diabetes. It is widely recognized that diabetes duration is a key predictor of both diabetes complications and heightened mortality risk. Consequently, a deeper understanding of the intricate interplay between visual impairment and type II diabetes in terms of morbidity and mortality necessitates investigations involving patient cohorts in the early stages of the disease.

Assessing visual acuity is a routine procedure in clinical settings, and it is pertinent to investigate whether this data holds any inherent prognostic value. The primary aim of this study was to determine the visual acuity of teachers diagnosed with type II diabetes, both those with diabetes and those without, with the objective of elucidating whether any observed associations could be attributed to confounding factors, particularly those related to cardiovascular disease, or if they were mediated through a concurrent increase in the occurrence of fractures and trauma.

OBJECTIVE OF THE STUDY:

1. To study the level of visual ability of diabetic and non-diabetic teachers.
2. To study the significant difference between the visual ability of diabetic and non-diabetic teachers.

METHODOLOGY:

Normative survey methods were used for this study. Data have been collected from various institutional and school teachers' affected and non-affected from diabetes and their visual ability is studied through self constructed questionnaire. Total 50 diabetic and 50 non-diabetic teachers have been selected for this study.

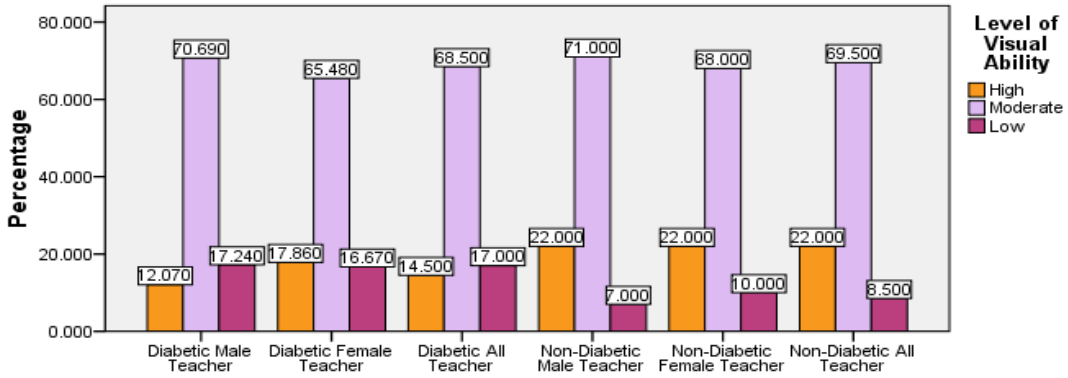
ANALYSIS:

Parametric statistical techniques were used for this study and conclude the result for this study.

Table no. 1.1

Level of Frequency distribution of Visual Ability of Diabetic and Non-diabetic teachers

Visual ability	Diabetic Teachers			Non-Diabetic Teachers		
	Male	Female	Total	Male	Female	Total
High	12.069%	17.857%	14.50%	22.00%	22.00%	22.00%
Moderate	70.689%	65.476%	68.50%	71.00%	68.00%	69.50%
Low	17.241%	16.667%	17.00%	7.00%	10.00%	8.50%
Total	100%	100%	100%	100%	100%	100%



Graph no. 1.1Diabetic and Non-Diabetic teachers High, Moderate and Low Level of Visual Ability.

From the Above table shown that, level of frequency distribution of Visual Ability for Diabetic and non-Diabetic teacher, 12.069% Diabetic male Teachers, 17.857% Diabetic Female teachers & 14.50% total Diabetic teachers are belongs to high level of Visual Ability. On the other hand 22.00% Non-Diabetic male teachers, 22.00% non-Diabetic female teachers and 22.50% total non-Diabetic teachers are belongs to high level of Visual Ability.

The moderate level of Visual Ability of Diabetic teachers indicated that, the 70.689% male Diabetic teachers, 65.476% female Diabetic teachers and 68.50% all Diabetic teachers are belongs to moderate level of Visual Ability. On the other hand 71.00% non-Diabetic male teachers, 68.00% non-Diabetic female teachers and 69.50% non-Diabetic all teachers are belongs to moderate level of Visual Ability.

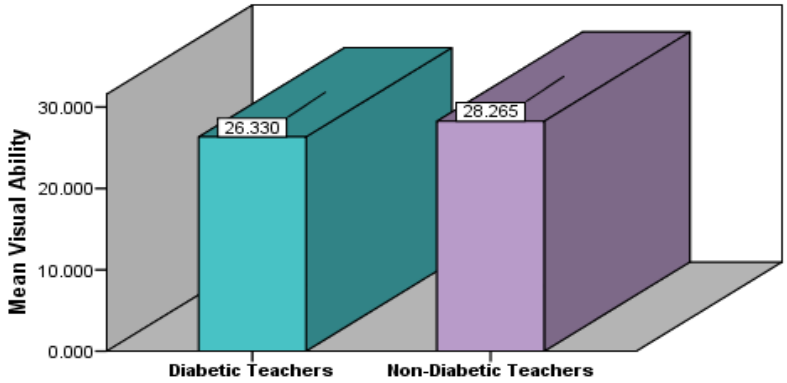
The low level of Visual Ability of Diabetic teachers indicated that, the 17.241% male Diabetic teachers, 16.667% female Diabetic teachers and 17.00% all Diabetic teachers are belongs to moderate level of Visual Ability. On the other hand 7.00% non-Diabetic male teachers, 10.00% non-Diabetic female teachers and 8.50% non-Diabetic all teachers having low level of Visual Ability.

The majority of Diabetic teachers (85.50%) having Moderate and Low level of Visual Ability where as Non-Diabetic teachers (91.50%) having High and Moderate level of Visual Ability. Most of the non-Diabetic teachers are belonging in Moderate level of Visual Ability compared to diabetic teacher level of Visual Ability. On the other hand most of the diabetic teachers belongs to low level of Visual Ability compared to non-diabetic teachers level of Visual Ability.

Table no. 1.2
Visual Ability of diabetic and non-diabetic teachers

Teachers	N	M	SD	Df	SE.dm	't' Value
Diabetic Teachers	50	26.330	7.817	398	.779	2.482**
Non-Diabetic Teacher	50	28.265	7.774			

* 0.01 Level of Significance ** 0.05 Level of Significance



Graph no. 1.2 Mean Plots of Visual Ability of Diabetic and Non-Diabetic Teachers.

INTERPRETATION:

From the above table shown that, the significant mean difference between the Visual Ability for the component of cognitive performance of Diabetic and Non-Diabetic Teachers. The Diabetic Teachers mean score of Visual Ability is 26.330 & SD is 7.817, and Non-Diabetic Teachers mean score of Visual Ability is 28.265 & SD is 7.774 respectively. Compare the mean score of Visual Ability for Diabetic and Non-Diabetic Teacher and calculated the SE.dm is 0.779 and calculated 't' value is 2.482, on 198 df table value is 1.96 on 0.05 level of significance and 2.58 for 0.01 level of significance. Hence the calculated 't' value is greater than the table value on 0.05 level of significance.

It is concluded that the mean score of Visual Ability for Non-Diabetic Teachers is effective compared to Diabetic Teachers. It means that, Non-Diabetic Teacher Visual Ability is better as compared to Diabetic Teacher's Visual Ability.

Diabetes Mellitus has significant effect on the Diabetic Teacher's Visual Ability. The non-Diabetic Teacher's Visual ability is better as compared to Diabetic teacher's visual ability.

CONCLUSION:

In our recent investigation, we observed a clear association between diminished visual acuity and an elevated risk of all-cause mortality among teachers diagnosed with type II diabetes, whether they had diabetes or not. This association remained relatively consistent, with only a slight reduction in strength, even after accounting for potential confounding variables. Additionally, we found that diabetic teachers with visual impairment at the time of diabetes diagnosis experienced a higher incidence of accidents. However, it's worth noting that the increased occurrence of fractures and trauma did not explain the excess mortality observed in this group. Interestingly, during the examination, we did not find that visual acuity was predictive of mortality or accident rates.

From a clinical perspective, our findings suggest that assessing visual acuity may hold particular significance in clinical decision-making shortly after a diabetes diagnosis, but its relevance diminishes as the disease progresses.

In this study, we also noted that diabetic teachers with both diabetes and visual impairment exhibited a higher prevalence of fractures/trauma, unhealthy lifestyle behaviors, hypertension, neuropathy, and cardiovascular diseases during the baseline examination. However, our data did not support the idea that these factors acted as intermediaries in the relationship between reduced visual acuity and all-cause mortality. This aligns with the findings of a previous study involving 50 individuals with type II diabetes, which indicated that diabetes complications accounted for only a small portion (10% to 18%) of the increased mortality risk associated with impaired visual acuity.

Considering the advanced age of our study participants and the significant proportion with age-related eye conditions and cardiovascular ailments at baseline, it's plausible that the elevated mortality risk among individuals with reduced visual acuity may be linked to biological aging. Age-related eye conditions like age-related macular degeneration (AMD) and cataracts are recognized as markers of biological aging and might contribute to an accelerated aging process. Moreover, diminished visual acuity may also reflect age-related changes in ocular structures, including alterations in eye shape, decreased lens elasticity, and a reduction in the number of retinal ganglion cells as individuals age.

The unexpected weak associations we observed between visual impairment assessed after a diabetes diagnosis and both all-cause and diabetes-related mortality raised questions, especially in light of the increasing prevalence of visual impairment and diabetic retinopathy over the study duration. Our multivariable analysis revealed that these apparent associations were predominantly influenced by lifestyle factors such as smoking, physical activity, and the specific trial arm participants were assigned to, as well as concurrent chronic conditions like peripheral neuropathy, cardiovascular disease, and cancer.

One plausible interpretation of our findings is that the severity of the disease leading to cardiovascular complications and diabetic retinopathy might have been the primary driver of visual impairment in individuals who experienced higher mortality rates in the years following their diabetes diagnosis. Even at the time of their diabetes diagnosis, patients with visual impairment exhibited a notably higher prevalence of hypertension and cardiovascular disease, which indicates an elevated risk of mortality.

Another perspective to consider is that the diabetes intervention we implemented potentially played a role in reducing mortality, particularly for individuals with visual impairment over the study period. The primary objective of this intervention, involving structured personal care, was to optimize patient follow-up, enhance self-care practices, and improve long-term glycemic control, ultimately reducing the risks of morbidity and mortality.
Lastly, it's important to acknowledge the possibility of a "healthy worker survivor bias" due to the substantial number of participants who passed away during the follow-up period. This bias could have influenced our findings, as individuals who remained in the study may have been relatively healthier than those who dropped out or were unable to continue participating.

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