



Prevalence Of Diabetic Retinopathy Among Diabetic Employees Of Rourkela Steel Plant (RSP), Odisha, India

Nabanita Jena^{1*}, Dr. A. Maria Therese², Dr. Malarvizhi³, Dr. J. Jasmine⁴, Dr Rasmi Ranjan Mohanty⁵

¹*Research Scholar, MTPG & RIHS

²Prof, Vice Principal, Department of Med Surg Nsg, College Of Nursing, MTPG & RIHS

³Prof & Head dept of Med Surg Nsg, College of Nursing, PIMS

⁴Prof, Head of dept of Med Surg Nsg, College of Nursing,, MTPG & RIHS

⁵Addl.CMO (MA&Oph), M&HS, RSP, SAIL

*Corresponding Author: Nabanita Jena

*Research Scholar, MTPG & RIHS

Abstract

India is home to approximately 77 million people with diabetes, and these numbers are predicted to increase to 125 million by 2045. Approximately one in five adults are now estimated to have diabetes in India. Most are diagnosed with type 2 diabetes during their working age, with some diagnosed only after developing complications. Diabetic retinopathy (DR) is a micro-vascular complication of diabetes that can progress without symptoms to vision-threatening diabetic retinopathy (VTDR). If left untreated, VTDR can result in irreversible visual loss

Objectives: To assess the prevalence of Diabetic Retinopathy and its associated factors among diabetic employee.

Methodology: Quantitative research approach and descriptive study design was adopted for this study. The population selected for the study was diabetic RSP employees in the age group of 30-60 years. Samples are diabetic RSP employees within the age group of 30- 60 years who is residing in Rourkela steel town ship and who met the inclusion criteria.

Result and Findings: In relation to the demographic variable of the participants (Table-1) it was observed that 44 (88%) participants were male and 6 (12%) were female. 16(32%) males and 2 (4%) females were suffering from Diabetes Retinopathy. With regards to glycaemic control 5(10%) respondents had good glycaemic control and 45 (90%) had poor glycaemic control. 2(4%) from good glycaemic control and 16 (32%) participants from poor glycaemic control had DR.

Conclusion: Study findings highlights that diabetic person need to have regular checkup and early diagnosis of this complication may save the vision.

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Introduction

India is home to approximately 77 million people with diabetes, and these numbers are predicted to increase to 125 million by 2045. Approximately one in five adults are now estimated to have diabetes in India. Most are diagnosed with type 2 diabetes during their working age, with some diagnosed only after developing complications. [1,2]

Globally, the prevalence of DR in diabetic patients is estimated to be 27.0%. A result on National Survey 2015-19 published in Pub Med in 2021 shows that prevalence of DR among persons with diabetes was 16.9%. According to the World Health Organization (WHO) it is estimated that DR makes up for 37 million cases of blindness in the world. Visual loss from DR makes a challenging management of diabetic comorbidities and reduced life expectancy and diminishes quality of life. Longer duration of diabetes, high fasting blood sugar level, presence of hypertension, obesity, being on insulin treatment alone, presence of diabetes in a family and poor socioeconomic status was the most consistent factors associated with the development of DR in diabetic patients.[3-6]

The risk of DR to sight can be reduced through good blood control, controlling of hypertension, effective early screening and having regular follow-up in a diabetic eye clinic.[7,8] Diabetic retinopathy could be treated with timely laser treatment, intraocular injection of steroids, anti-vascular endothelial growth factor agents and intraocular surgery.[9] The epidemiology and risk factors of DR has been adequately described in developed nations and a few numbers of studies have been attempted in the developing nations as well.[10] However, there is paucity of studies addressing the prevalence of DR and underlying risk factors in Odisha, Rourkela, and no previous study was available in the study area before. Therefore, this study aimed to assess the prevalence and associated factors of DR in a diabetic patient attending at Eye OPD of Ispat General Hospital, RSP, SAIL.

Objectives

- ❖ To assess the prevalence of Diabetic Retinopathy and its associated factors among diabetic Rourkela Steel Plant Employees on follow-up at Ispat General Hospital, RSP ,SAIL.
- ❖ To associate the risk factors with the selected demographic and clinical variables among the diabetic patients

Methodology-Quantitative research approach and descriptive study design was adopted for this study. The population selected for the study was diabetic RSP employees in the age group of 30-60 years. Samples are diabetic RSP employees within the age group of 30- 60 years who is residing in Rourkela steel town ship and who met the inclusion criteria. The RSP employees will be selected with the following pre-determined set of criteria.

Inclusion Criteria

RSP employees who were diagnosed as diabetes

- Within 30-60 years of age group
- Male or female
- FBS level at ≥ 125 , took insulin or reported ever having been told by a physician or health care professionals that they have diabetes.
- Willing to participate in the study
- Able to communicate in Odia/English language
- Present at the time of data collection

Exclusion Criteria

Diabetes RSP employees who were

- Diabetes Patients with pregnancy induced diabetes (gestational diabetes)
- Diabetes Patients who were severely ill, uncomfortable for the interview.
- Diabetes Patients who were unable to be seated and examined with slit lamp indirect ophthalmoscope or Optical Coherence Tomography (OCT).
- Unable to understand Odia/ English language.

Development and Description of Tool

In this study structured modified questionnaire tool was used to collect the data from the samples consists of two sections:

Section -A-This section consists of socio demographic variables which include age, gender, religion, education, marital status, Occupational status, family history of any chronic disease.

Section – B -This section consists of structure interview schedule of 18 questions Clinical and behavioural characteristics (Alcohol consumption, smoking, duration of diabetes, BMI, Waist to hip ratio, Glycaemic control, Mode of treatment, Hypertension, Chronic Kidney Disease, Chronic Cardiac Disease, Type of diabetes, Frequency of DM clinic visit, Visual acuity Test, Routine DR Eye screening, Retinal Examination , Presence of DR , DR Health Education) to assess the presence of Diabetic Retinopathy in diabetic RSP employees.

Data Collection Procedure:

Data collection was done after getting permission from concerned authorities. The accessible adult people who were fit for the inclusion criteria was selected and approached. Before collecting data, researchers introduces herself and explain the purpose of the study and got consent. Each subject was interviewed using the tool . The investigator was asked each question systematically, pacing with their understanding and response. Blood pressure was measured from participants in sitting position using android Digital sphygmomano meter. When the Systolic blood pressure more than 140mmHg and/or diastolic blood pressure more than 90mmHg for two consecutive measurements apart from four hours and ongoing treatment with hypertension were assessed. The RSP employees with chronic kidney disease had been diagnosed by a physician was recorded on their patient registry book. Glycaemic level was interpreted as poor or good. Poor glycaemic control is defined as mean fasting blood glucose more than 125 mg/dl for 6 months. Height was measured with movable head board (stadiometer)and recorded to the nearest 0.1 cm. Weight was measured with a digital weighing scale and recorded to the nearest 0.1 kg. Visual acuity was tested at 6 m in a well illuminated area using a Snellen chart. If participant vision were too poor to read any letter on the chart at 6m distance, then counting finger, hand movement and light perception was assessed.

Fundus Examination and Diagnostic Criteria:-

Eye examination was carried out by experienced ophthalmologists. Mydriasis of both eyes was assessed with 1% tropicamide and retinal examination and a TRC-NW&SF fundus camera (Topcon, Tokio, Japan) was used to capture 45degree C color digital image of the fundus of both eyes.

According to the Early Treatment Diabetic Retinopathy Study, those with microaneurysms, haemorrhage, hard exudates, cotton-wool spots; retinal vein beading changes, microvascular abnormalities in the retina, and/or neovascularization lesions on fundus images were diagnosed with DR. On fundus examination, the presence of microaneurysms, cotton-wool spots, haemorrhage, vein beading, exudates, and/or intraretinal microvascular abnormalities were diagnosed as preproliferative DR, whereas the presence of new vessels on the disease or elsewhere and/or vitreous haemorrhage were diagnosed as proliferative DR.

Result and Findings- In relation to the demographic variable of the participants (Table-1) it was observed that 44 (88%) participants were male and 6 (12%) were female. 16(32%) males and 2 (4%) females were suffering from Diabetes Retinopathy. Around 45 (90%) participants were Hindu, 40 (80%) were above 40 years and 10 (20%) samples were below 40 years. 10 (20%) participants above the age of 40 years and 2(10%) participants below the age of 40 years had DR. 49(98%) participants were married. Out of 49 married respondents 17 (34%) participants had DR and only 1 unmarried participants was suffering from DR.

With regards to occupation 34(68%) participants were moderate worker . Out of 13 heavy worker 5 (10%) had DR. Out of 34 Moderate worker 11 (22%) had DR. Out of 3 sedentary worker 2 (4%) had DR. With regards to education 45 (90%) had undergraduate and 5(10%) were graduate. 16 (32%) undergraduate and 2 (4%) graduates were suffering from DR.

In relation to the Family History of DM it showed that 32 (64%) participants had family history of Diabetes Mellitus out of which 12 (24%) were suffering from DR and 6 (12%) participants had DR who did not have family history of DM . Regarding Alcohol Consumption 39 (78 %) participants had habit of drinking alcohol

and out of 39 drunker, 24 participants had DR . Out of 11 non-drunker, 3 participants had DR. Regarding smoking history 39 (78%) participants were smokers . Out of 39 smokers, 16 were suffering from DR. Among non smokers 2 participants suffering from DR.

Table 1: Distribution of Socio Demographic Variables (n=50)

SL NO	Table 1		Presence of DR		Total
			No	Yes	
1.1	Sex	Male	28 (56%)	16 (32%)	44 (88%)
		Female	4 (8%)	2 (4%)	6 (12%)
1.2	Religion	Hindu	28 (56%)	17 (34%)	45 (90%)
		Christian	3 (6%)	1 (2%)	4 (8%)
		Muslim	1 (2%)	0 (0%)	1 (2%)
1.3	Age	<=40	8 (16%)	2 (4%)	10 (20%)
		>40	24 (48%)	16 (32%)	40 (80%)
1.4	Marital status	Married	32 (64%)	17 (34%)	49 (98%)
		unmarried	0	1 (2%)	1 (2%)
1.5	Occupation	Heavy Worker	8 (16%)	5 (10%)	13 (26%)
		Moderate Worker	23 (46%)	11 (22%)	34 (68%)
		Sedentary Worker	1 (2%)	2 (4%)	3 (6%)
1.6	Education	Under Graduate	29 (58%)	16 (32%)	45 (90%)
		Graduate	3 (6%)	2 (4%)	5 (10%)
1.7	Family history of DM	No	20 (40%)	12 (24%)	32 (64%)
		YES	12 (24%)	6 (12%)	18 (32%)
1.8	Alcohol Consumption	Drunker	24 (48%)	15 (30%)	39 (78%)
		Never	8 (16%)	3 (6%)	11 (22%)
1.9	Smoking	Yes	23 (46%)	16 (32%)	39 (78%)
		NO	9 (18%)	2 (4%)	11 (22%)
Total			32	18	50

Table-2 presents the behavioural, clinical and diabetics care related information of the participants highlights that 27 (54%) participants had diabetics for more than 10 years out of which 9(18%) participants had DR and 9(18%) participants had DR among those have less than 10 years. .

With regards to glycaemic control 5(10%) respondents had good glycaemic control and 45 (90%) had poor glycaemic control. 2(4%) from good glycaemic control and 16 (32%) participants from poor glycaemic control had DR.

In relation to mode of treatment 6(12%) participants were on insulin therapy out of them 1(2%) had DR. 42(84%) were on Tablets for their glycaemic control, out of which 16(32%) had DR. 2(4%) participants were (both) on insulin and tablets for their glycaemic control and 1 had DR.

With regards to History of Hypertension 34(68%) had history of Hypertension . Out of which 11 (22%) participants had DR. 7(14%) participants had DR from participants don't had history of Hypertension. 8(16%) participants had history of Chronic Kidney Disease out of which 3(6%) had DR. 15(30%) participants had DR from patients those do not have history of CKD. 4 (8%) participants had history of Chronic cardiac illness out of which 1(2%) participant had DR. and 17(34%) participants had DR from participants doesn't had history of cardiac disease.

In relation to type of diabetes all the participants 50 (100%) belongs to Type 2 Diabetes Mellitus out of which 18(36%) participants had DR.

Regarding the followup care it highlights that 23 (46%) participants had follow up for DM in every 2 months, 8 (16%) participants had follow up in every 6 months and 19 (38%) participants had yearly follow up for their DM. The respondents who had follow up in every 2 months ,out of that, 9(18%) participants had DR. Respondents who had check up every 6 months, 4 (8%) had DR. Participants who had DM check up every year, out of that 5(10%) had DR.

All 50(100%) participants had their visual acuity test out of which 18 (36%) had DR. 16 (32%) samples had their routine Diabetes Retinopathy eye screening . Respondents those who have done routine DR eye screening out of that 5(10%) had DR. 34(68%) respondents who had not done their routine DR eye screening out of that 13(26%) had DR.

45 (90%) participants had their Retinal examination by OCT (Optical Coherence Tomography) and 5 (10 %) samples have done retinal examination by both (OCT and Slit lamp examination) .Out of 45 respondents whose retinal examination done with OCT, 16(32%) were suffering from DR. 5 respondents who had retinal examination with both (OCT and slit lamp) out of which 2 participants had DR.

17 (34%) participants received Diabetes Retinopathy related Health Education and . Out of 17 samples who received DR health education, 5(10%) had DR. The samples who had not received DR Health Education, 13(26%) had DR. (Table-2)

Tab-2: Behavioral, clinical and diabetes care related characteristic of respondent (n=50)

SL NO		Presence of DR		Total	
		No	Yes		
Table 2					
2.1	Duration of DM illness	<10 Years	14 (28%)	9 (18%)	23 (46%)
		>10 Years	18 (36%)	9 (18%)	27 (54%)
2.2	BMI	>30	7 (14%)	0 (0%)	7 (14%)
		18-24.9	1 (2%)	2 (4%)	3 (6%)
		25-29.9	24 (48%)	16 (32%)	40 (80%)
2.3	Waist Hip Ratio (Men)	<=0.90	1(2%)	2(4%)	3 (6%)
		>0.90	25(50%)	16(32%)	41(82%)
	Waist Hip Ratio (Women)	<=0.85	1(2%)	0 (0%)	1 (2%)
		>0.85	3(6%)	2 (4%)	5(10%)
2.4	Glycaemic control	Good	3 (6%)	2 (4%)	5 (10%)
		Poor	29 (58%)	16 (32%)	45 (90%)
2.5	mode of Treatment	Insulin	5 (10%)	1 (2%)	6 (12%)
		Tablet	26 (52%)	16 (32%)	42 (84%)
		Both	1 (2%)	1 (2%)	2 (4%)
2.6	Hypertension	Yes	23 (46%)	11 (22%)	34 (68%)
		No	9 (18%)	7 (14%)	16 (32%)
2.7	Chronic kidney disease	Yes	5 (10%)	3 (6%)	8 (16%)
		NO	27 (54%)	15 (30%)	42 (84%)
2.8	Chronic cardiac illness	Yes	3 (6%)	1 (2%)	4 (8%)
		No	29 (58%)	17 (34%)	46 (92%)
2.9	Type of diabetes	Type II	32 (64%)	18 (36%)	50 (100%)
2.10	Follow up frequency	Every 2 Months	14 (28%)	9 (18%)	23 (46%)
		Every 6 Months	4 (8%)	4 (8%)	8 (16%)
		Yearly	14 (28%)	5 (10%)	19 (38%)
2.11	Visual acuity test	yes	32 (64%)	18 (36%)	50 (100%)
2.12	Routin DR eye screening	Yes	11 (22%)	5 (10%)	16 (32%)
		No	21 (42%)	13 (26%)	34 (68%)
2.13	Retinal Examination	OCT	29 (58%)	16 (32%)	45 (90%)
		Both	3 (6%)	2 (4%)	5 (10%)
2.14	DR Health Education	Yes	12 (24%)	5 (10%)	17 (34%)
		No	20 (40%)	13 (26%)	33 (66%)
	Total		32	18	50

With regards to prevalence reveals that out of 50 Rourkela Steel Plant Employees suffering from Diabetes Mellitus taken as the sample for this study, 32(64%) had Diabetes Retinopathy (DR) and 18(36%) participants had Diabetes Retinopathy (DR).

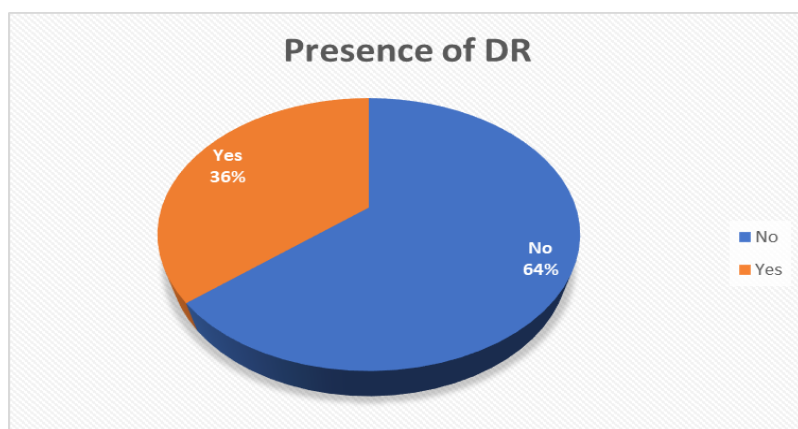


Table -3-Multivariate analysis of sociodemographic, clinical and diabetes care and treatment modality characteristics of patients (n=50)

Variables		Retinopathy		COR (95% CI)	AOR (95% CI)	P-Values
		No	Yes			
Age	<=40	8 (16%)	2 (4%)	1	1	
	>40	24 (48%)	16 (32%)	6.35 (2.12 - 10.35)	1.31 (0.070 - 1.999)	0.251
Glycaemic Control	Good	3 (6%)	2 (4%)	1	1	
	Poor	29 (58%)	16 (32%)	8.12 (3.462 - 15.245)	1.038 (0.182 - 8.002)	0.004
Hypertension	Yes	23 (46%)	11 (22%)	1	1	
	No	9 (18%)	7 (14%)	2.35 (5.32 - 9.23)	0.669 (0.181 - 2.086)	0.000
Body Mass Index	18-24.9	1 (2%)	2 (4%)	1	1	
	25-29.9	24 (48%)	16 (32%)	5.62 (2.65 - 6.354)	0.753 (0.251 - 35.910)	0.002
	>30	7 (14%)	0 (0%)	0	0	0.999
Type of Diabetes	Type II	32 (64%)	18 (36%)	2.75 (3.65 - 23.3452)	2.152 (0.324 - 0.952)	0.523
Duration of DM	<10 Years	14 (28%)	9 (18%)	1	1	
	>10 Years	18 (36%)	9 (18%)	8.35 (3.45 - 14.3)	0.181 (0.404 - 4.040)	0.671

Table 3 highlights the results of the logistic regression revealed that the BMI, Hypertension, and the glycaemic control history of the patient are significantly associated with the presence of diabetic retinopathy. Regarding glycaemic control it is revealed that the odds of developing DR in case of poorly managed persons are about one time (AOR 1.038, 95% CI 0.182- 8.002) more than the properly managed persons. The odds for developing DR in case of patients with hypertension is 0.669 (AOR 0.669, 95% CI 0.181 - 2.086) times than patients with no symptoms of hypertension. Regarding the overweight and obese persons, the chances of developing DR is 0.753 times more than normal weight persons (AOR 0.753 95% CI 0.251 - 35.910).

IMPLICATIONS:

The implication of this study can lie in the area of nursing research, nursing education, nursing administration.

Nursing Practice:

The Diabetic patients should be regularly assessed for the prevalence of Diabetic Retinopathy and should be assessed more regularly in the patients who has Diabetic Mellitus history more than 10 years.

Nursing Education:

The above study shows that the Steel Plant employees are more prone to get Diabetic Mellitus. If the disease is poorly managed can lead to complication like Diabetic Retinopathy which ultimately may lead to Blindness. The Diabetic patients should be given health education related to Diabetic Retinopathy.

Nursing Research:

The clinical research on prevalence of Diabetic Retinopathy by nurses is needed, so as to provide scientifically evidence to support practice, as this is promising activity area for nurses.

Nursing Administration:

The nursing administration plays a vital role in management provision of necessary facilities, adequate training, guidance and supervision to prevent and manage Diabetic Retinopathy.

RECOMMENDATIONS:

This study may be replicated on larger samples:

- Similar study can be conducted for longer duration.
- Similar study can be done using experimental research design.
- Similar study can be done on different population.

Conclusion- Diabetic retinopathy (DR) is a micro-vascular complication of diabetes that can progress without symptoms to vision-threatening diabetic retinopathy (VTDR). If left untreated, VTDR can result in irreversible visual loss. Therefore, periodic retinal screening is recommended for all people with diabetes to enable prompt identification and treatment of VTDR.

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