A study on risk factors of diabetic retinopathy among patients attending to Ophthalmology department in Government General Hospital, Kurnool, Andhra Pradesh

Praveena Ganapa¹, Visweswara Rao. Guthi², V.Soujanya³, G.Sindhura⁴

Date of Submission: 26.12.2016 Date of Acceptance: 24.03.2017

Abstract

**Background:** Globally, the number of people with diabetic retinopathy will grow from 126.6 million in 2010 to 191.0 million by 2030. Diabetic retinopathy is important cause of avoidable blindness in India. Treatment interventions at early stages of diabetic retinopathy can reduce burden of blindness due to diabetic retinopathy. **Objectives:** 1) To study the association of socio demographic factors with diabetic retinopathy. 2) To know the proportion of diabetic retinopathy among study population. 3) To know the factors associated in progression of diabetic retinopathy among study population. **Methodology:** This was hospital based cross sectional study conducted ophthalmology OPD, government general hospital, tertiary care centre, Kurnool city of Andhara Pradesh from 1.10.2014 to 31.12.2014. The study population includes all the patients attending to ophthalmic department during these 2 months with different symptoms. Fundoscopy was used to diagnose diabetic retinopathy by ophthalmic experts. Pretested semistructured questionnaire was administered. **Results:** Results show that out of 355 patients 72 patients had diabetic retinopathy. Out of 72 patients with diabetic retinopathy 39 were known diabetics and 33 were newly diagnosed as diabetics. Diabetic retinopathy was found to be significantly associated with duration of diabetes, hypertension, smoking, hyperlipidemia, physical activity and socioeconomic status. **Conclusions:** Prevalence of diabetic retinopathy is 20.3%. Diabetic retinopathy was found to be significantly associated with duration of diabetes, hypertension, smoking, hyperlipidaemia, physical activity and socioeconomic status. **Key words:** Diabetic Retinopathy, Duration of diabetes, Socio demographic factors, Risk factors

**Authors:**
1-Senior resident, Department of Community Medicine, Kurnool Medical College, Kurnool. 2-Assistant Professor, Department of Community Medicine, Kamineni Institute of Medical Sciences, Narketpally. 3-fellow in phaco refractive surgery, BW lions hospital, 4-post graduate, Kurnool Medical College, Kurnool.

**Corresponding Author:**
Dr. Praveena Ganapa,
Senior resident,
Department of Community Medicine, Kurnool Medical College, Kurnool. A.P.
E-Mail: vissumbbs@gmail.com

**Introduction:**
Globally, the number of people with Diabetic Retinopathy (DR) will grow from 126.6 million in 2010 to 191.0 million by 2030, and estimate that the number with vision-threatening diabetic retinopathy (VTDR) will increase from 37.3 million to 56.3 million, if prompt action is not taken.¹ A recent systematic review of 35 population-based studies showed that the prevalence of DR, proliferative diabetic retinopathy (PDR), and VTDR among individuals with diabetes is 34.6%, 7.0%, and 10.2%, respectively.² DR is rapidly emerging as a global health issue that may threaten patients visual acuity and visual functioning. Although treatment of established retinopathy can reduce the risk for visual loss by 60%,³ DR remains the leading cause of blindness among working-age adults in the world. The proportion of blindness attributable to DR ranges from 3–7% in much of South-East Asia and the Western Pacific region to 15–17% in the developed regions of the Americas and Europe.⁴
Diabetes has emerged as a major public health problem in India. According to the World Health Organization, the number of cases of type 2 diabetes mellitus (DM) will grow from 19 million in 1995 to nearly 80 million in 2030 and India will emerge one of the major hubs of diabetic population.\(^a\)\(^b\) Nearly half of the patients with diabetes would have some degree of DR at any given time.\(^c\)\(^d\) After 15 years of duration of DM, DR will develop in nearly all patients with type 1 DM and about 75% of those with type 2 DM.\(^e\)\(^f\)

Diabetic retinopathy constitutes sixth common cause of blindness in India.\(^g\) The major contributing factor toward the development of blindness is the progression to an advanced stage of the disease. The patients themselves never visit an ophthalmologist in the early stage of DR when it is often asymptomatic. The key to maintenance of good vision in these eyes is the early detection and treatment that can be done by screening all the patients with a diagnosis of DM.\(^h\)

Since diabetic retinopathy is important cause of avoidable blindness in India. Treatment interventions at early stages of diabetic retinopathy can reduce burden of blindness due to diabetic retinopathy. So the present study was taken up to know prevalence of diabetic retinopathy. The objectives of present study were to study the socio demographic profile among patients with diabetic retinopathy, to know the proportion of diabetic retinopathy among known and unknown cases of diabetics and to know the factors associated in progression of diabetic retinopathy among diabetics.

**Material and methods:**
The present study was hospital based cross sectional study done in out patient department of Ophthalmology, government general hospital, Kurnool city of Andhra Pradesh from 1.10.2014 to 31.12.2014. The study population includes all the patients attending to ophthalmic department during these 2 months with different symptoms. Patients who were suspected to have diabetes were subjected to random blood sugar estimation for confirmation of having diabetes, and those having RBS of more than 200mg/dl were confirmed of having diabetes. Fundoscopy was used to diagnose diabetic retinopathy by ophthalmic experts.

**Study procedure:** Pretested semi structured questionnaire was administered. Socio demographic information of patients was recorded. In case of previously diagnosed diabetic patients duration of diabetes was recorded. Habits regarding smoking, alcoholism, tobacco chewing were recorded. Blood pressure was recorded with sphygmomanometer in sitting position. Haemoglobin levels were estimated by Sahlis method and persons with <10mg/dl were taken as anaemic. Lipid levels were estimated and those having serum cholesterol levels > 200mg/dl were taken as having hyperlipidemia. BMI was estimated by measuring height and weight. According to early treatment diabetic retinopathy study classification of DR:

**Non proliferative diabetic retinopathy:** Micro aneurysms, retinal hemorrhages, cotton wool spots, intraretinal micro vascular abnormalities without neovascularization.

**Proliferative diabetic retinopathy:** Micro aneurysms, retinal hemorrhages, cotton wool spots, intraretinal micro vascular abnormalities with neovascularization.

**Non proliferative diabetic retinopathy grading:**
- **Very mild:** Micro aneurysms only.
- **Mild:** Micro aneurysms, retinal hemorrhages, cotton wool spots.
- **Moderate:** Cotton wool spots-common, severe retinal hemorrhages in 1-3 quadrants, significant venous bleeding present in 1 or more quadrants.
- **Severe:** 4-2-1 rule: one or more severe hemorrhages in all 4 quadrants, significant venous bleeding in 2 or more quadrants, moderate intraretinal micro vascular abnormalities in 1 or more quadrants.
- **Very severe:** Two or more criteria for severe.\(^i\)

Statistical analysis was done with SPSS version 20. Mannwhitneys U test and chi square tests were used to test the significance. P<0.05 was regarded as statistically significant.

**Results and observations:**
It was observed from the table 1 that majority of the study population belong to 44-54 years of age group(148/355) followed by 35-44 years of age group(117/355) and ≥55 years of age group(90/355). Among the study population, diabetic retinopathy was more among the 44-54 years of age.
Table 1: Distribution of study population according to socio demographic factors

<table>
<thead>
<tr>
<th>Socio demographic factor</th>
<th>Diabetic retinopathy (DR) present</th>
<th>Diabetic retinopathy (DR) absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35-44 years</td>
<td>23(19.6%)</td>
<td>94(80.4%)</td>
<td>117(100%)</td>
</tr>
<tr>
<td>44-54 years</td>
<td>31(20.9%)</td>
<td>117(79.1%)</td>
<td>148(100%)</td>
</tr>
<tr>
<td>≥55 years</td>
<td>18(20%)</td>
<td>72(80%)</td>
<td>90(100%)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>40(22.1%)</td>
<td>141(77.9%)</td>
<td>181(100%)</td>
</tr>
<tr>
<td>Female</td>
<td>32(18.3%)</td>
<td>142(81.7%)</td>
<td>174(100%)</td>
</tr>
<tr>
<td>Literacy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>24(19.5%)</td>
<td>99(85.5%)</td>
<td>123(100%)</td>
</tr>
<tr>
<td>Literate</td>
<td>48(20.6%)</td>
<td>184(79.4%)</td>
<td>232(100%)</td>
</tr>
<tr>
<td>Socioeconomic status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper</td>
<td>3(9.3%)</td>
<td>29(90.7%)</td>
<td>32(100%)</td>
</tr>
<tr>
<td>Upper Middle</td>
<td>6(11.1%)</td>
<td>48(88.9%)</td>
<td>54(100%)</td>
</tr>
<tr>
<td>Middle</td>
<td>11(9.8%)</td>
<td>101(90.2%)</td>
<td>112(100%)</td>
</tr>
<tr>
<td>Lower Middle</td>
<td>33(42.3%)</td>
<td>54(57.7%)</td>
<td>78(100%)</td>
</tr>
<tr>
<td>Lower</td>
<td>19(24%)</td>
<td>60(76%)</td>
<td>79(100%)</td>
</tr>
<tr>
<td>Total</td>
<td>72(20.3%)</td>
<td>283(79.7%)</td>
<td>355(100%)</td>
</tr>
</tbody>
</table>

Table 2: Distribution of study population according to habits

<table>
<thead>
<tr>
<th>Habits</th>
<th>DR present</th>
<th>DR absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smokers</td>
<td>58(30.3%)</td>
<td>133(69.7%)</td>
<td>191(100%)</td>
</tr>
<tr>
<td>Non smokers</td>
<td>14(8.5%)</td>
<td>150(91.5%)</td>
<td>164(100%)</td>
</tr>
<tr>
<td>Alcoholism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcoholics</td>
<td>27(18.6%)</td>
<td>118(81.4%)</td>
<td>145(100%)</td>
</tr>
<tr>
<td>Non alcoholics</td>
<td>45(21.4%)</td>
<td>165(78.6%)</td>
<td>210(100%)</td>
</tr>
<tr>
<td>Tobacco chewing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>39(16.2%)</td>
<td>210(83.8%)</td>
<td>249(100%)</td>
</tr>
<tr>
<td>Absent</td>
<td>33(28.6%)</td>
<td>82(71.4%)</td>
<td>115(100%)</td>
</tr>
<tr>
<td>Total</td>
<td>72(20.3%)</td>
<td>283(79.7%)</td>
<td>355(100%)</td>
</tr>
</tbody>
</table>

Table 3: Distribution of the type of DR according to time of diagnosis of diabetes

<table>
<thead>
<tr>
<th>Time of diagnosis of diabetes</th>
<th>Non proliferative DR</th>
<th>Proliferative DR</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newly diagnosed diabetics</td>
<td>27 (81.8%)</td>
<td>6 (18.2 %)</td>
<td>33(45.8%)</td>
</tr>
<tr>
<td>Previously diagnosed diabetics</td>
<td>35 (89.7%)</td>
<td>4(10.3%)</td>
<td>39 (54.2%)</td>
</tr>
<tr>
<td>Total</td>
<td>62 (86.1%)</td>
<td>10 (13.9%)</td>
<td>72 (100%)</td>
</tr>
</tbody>
</table>

Figure 1: Relation of duration of diabetes with type of diabetic retinopathy

\[ \chi^2 = 5.5124, \ P = 0.018 \]

Risk factors of diabetic retinopathy. Praveena Ganapa et al.

Click here for more articles: www.commedjournal.in
Figure 2: Relation of duration of diabetes with grade of non proliferative diabetic retinopathy

![Graph showing relation of duration of diabetes with grade of non proliferative diabetic retinopathy.](image)

Mann Whitney U = 11.5,  \( P = 0.001 \)

Table 4: Distribution of study population according to risk factors

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>DR present</th>
<th>DR absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hypertension</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertensives</td>
<td>49(28.6%)</td>
<td>122(71.4%)</td>
<td>171(100%)</td>
</tr>
<tr>
<td>Normotensives</td>
<td>23(12.5%)</td>
<td>161(87.5%)</td>
<td>184(100%)</td>
</tr>
</tbody>
</table>

\( \chi^2 = 14.3066 \),  \( P = 0.00005 \)

<table>
<thead>
<tr>
<th>Hyperlipidemia</th>
<th>Present</th>
<th>Absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>40(28.3%)</td>
<td>101(71.7%)</td>
<td>141(100%)</td>
</tr>
<tr>
<td>Absent</td>
<td>32(14.9%)</td>
<td>182(85.1%)</td>
<td>214(100%)</td>
</tr>
</tbody>
</table>

\( \chi^2 = 9.4614 \),  \( P = 0.0020 \)

<table>
<thead>
<tr>
<th>Anemia</th>
<th>Present</th>
<th>Absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>29(21.6%)</td>
<td>105(78.4%)</td>
<td>134(100%)</td>
</tr>
<tr>
<td>Absent</td>
<td>43(19.4%)</td>
<td>178(80.6%)</td>
<td>221(100%)</td>
</tr>
</tbody>
</table>

\( \chi^2 = 0.2463 \),  \( P = 0.6197 \)

<table>
<thead>
<tr>
<th>BMI</th>
<th>Obese</th>
<th>Non obese</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obese</td>
<td>20(14.2%)</td>
<td>121(95.8%)</td>
<td>141(100%)</td>
</tr>
<tr>
<td>Non obese</td>
<td>52(32.1%)</td>
<td>162(67.9%)</td>
<td>214(100%)</td>
</tr>
</tbody>
</table>

\( \chi^2 = 5.3783 \),  \( P = 0.0203 \)

It was observed table 2 that majority of the study subjects were smokers (191/355). Among the study population diabetic retinopathy was more among the smokers (30.3%) compared to non-smokers (8.5%). This difference was statistically significant.

Majority of the study subjects were non-alcoholics (210/355). Among the study population diabetic retinopathy was more among non-alcoholics (21.4%) compared to alcoholics (18.6%). This difference was not statistically significant.

In the study population majority population were having habit of tobacco chewing (240/355) and among the study population diabetic retinopathy was more among the persons not having the habit of tobacco chewing (28.6%) compared to persons with habit of tobacco chewing (16.2%). This difference was statistically significant.

Among the study population 20.3% (72/355) were having diabetic retinopathy.

Among the study population having diabetic retinopathy, 45.8% (33/72) were newly diagnosed diabetic patients and 54.2% (39/72) were previously diagnosed diabetic patients.

Among the study population having non-proliferative diabetic retinopathy majority were previously diagnosed diabetics (89.7%) and among the proliferative diabetic retinopathy patients majority were newly diagnosed diabetics (18.2%).

Figure 1 shows that among the study population who were previously known diabetics and having non-proliferative diabetic retinopathy (35/72) majority were having duration of diabetes of 9-14 years of illness (94.1%). Among the study population who were previously known diabetics and having proliferative diabetic retinopathy (4/72) majority were having duration of diabetes of 5-8 years of illness (40%). This difference was statistically significant.

Figure 2 shows that among the study population who were previously known diabetics and having non-proliferative diabetic retinopathy (35), very severe grade (63.4%), severe grade (23.3%) and moderate grade (6.7%) of non proliferative diabetic retinopathy were more among the persons with duration of diabetes 9-14 years of diabetic patients and mild (40%) and very mild (40%) grades were persons with duration of diabetes 5-8 years. These differences were statistically significant.

It was observed from the table 4 that majority of the study population were normotensives (184/355) and among the study population diabetic retinopathy was more common in hypertensives (28.6%) compared to normotensives (12.5%). This difference was statistically significant.

Majority of the study population were having no hyperlipidemia (214/355) and among the study population diabetic retinopathy was more among persons having hyperlipidemia (28.3%) compared to persons having no hyperlipidemia (14.9%). This difference was statistically significant.

Majority of the study population were not having anemia (221/355) and among the study population diabetic retinopathy was more among persons with anemia (21.6%) compared to persons without...
anemia (19.4%). This difference was not statistically significant.

Majority of the study population were non obese (214/355) and among the study population diabetic retinopathy was more among non obese persons (32.1%) compared to persons who were obese (12.5%). This difference was statistically significant.

**Discussion:**
This was hospital based cross sectional study conducted in 355 patients approaching ophthalmic OP, government general hospital, tertiary care centre, Kurnool city during October 2014 to December 2014. Current study shows that DR was more among 44–55 years of age group, males, literates and were significantly associated. DR was more among lower socio economic class and was not significantly associated.

In the multivariate analysis conducted by the Lalit Dandona et al it was observed that subjects belonging to the upper or middle socioeconomic strata had a 86% higher chance of having DR than those belonging to the lower or extreme lower strata though this did not reach statistical significance. It was observed that prevalence of DR was more among the 50-59 years of age group (5.84%), among males (2.24%) and middle socio economic class (2.78%).

In the study conducted by Klein R et al it was observed that the prevalence and severity of DR increases with increasing age in type 1 DM but not in type 2 DM.

DR was more common among the smokers (30.3%), non alcoholics (21.4%), and in the persons who did not had habit of tobacco chewing (28.6%). Among these habits smoking was significantly associated with DR.

Present study shows that among the study population 20.3% (72/355) were having diabetic retinopathy. Among the study population having diabetic retinopathy, 45.8% (33/72) were newly diagnosed diabetic patients and 54.2% (39/72) were previously diagnosed diabetic patients.

In the study conducted by Lalit Dandona et al it was observed that in the urban population studied, the prevalence of self reported diabetes was 7.8% in those >30 years old. Almost all of the self reported diabetes was diagnosed at >30 years of age. DR was present in 22.4% of the self reported diabetics.

These findings were contradicting the present study findings.

In comparison, 22.8% of those with self reported diabetes had DR in the Melbourne Visual Impairment Project, and 32.4% of the diabetics in Blue Mountains Eye Study, 26% in Rotterdam Study, and 36.8% in Beaver Dam Eye Study. These results were contradicting to present study findings.

In Melton Study, 52% of those with self reported diabetes had DR. These findings were similar to present study findings.

In the present study it was observed that among of the study population who were previously known diabetics and having non proliferative diabetic retinopathy (35/72) majority were having duration of diabetes of 9-14 years of illness (94.1%) and having proliferative diabetic retinopathy (4/72) majority were having duration of diabetes of 5-8 years of illness (40%). This difference was statistically significant. Among the study population who were previously known diabetics and having non proliferative diabetic retinopathy (35), very severe grade (6.7%), severe grade (23.3%) and moderate grade (63.4%) of non proliferative diabetic retinopathy were more among the persons with duration of diabetes 9-14 years of diabetic patients and mild (40%) and very mild (40%) grades were persons with duration of diabetes 5-8 years. These differences were statistically significant.

Similar findings were observed in the study conducted by Klein R et al there was a direct correlation between the frequency and severity of DR and the duration of diabetes mellitus.

In the study conducted by Lalit Dandona et al it was observed that, 87.5% of those with duration of diabetes since diagnosis >15 years had DR compared with 18.9% of those with duration <15 years. Vast majority of those with DR had mild or moderate NPDR (89.3%); severe NPDR or PDR was present in only 10.7%.

In the study conducted by Klein R et al it was observed that, increase in duration of diabetes has been associated with higher risk of blindness which increases particularly after about 15 years of diabetes.

Current study shows that among the study population diabetic retinopathy was more among hypertensives (28.6%), among persons having hyperlipidemia (28.3%) and in among persons with...
Risk factors of diabetic retinopathy. Praveena Ganapa et al.

Click here for more articles: www.commedjournal.in

12

References:


Risk factors of diabetic retinopathy. Praveena Ganapa et al.

Click here for more articles: www.commedjournal.in