



“AN AVERAGE BURDEN OF FINANCE IN PATIENT WITH DIABETIC RETINOPATHY”

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ABSTRACT

Background: Diabetes is a chronic life style disease that has numerous systemic and ocular manifestations. The cost of diabetes can be a major burden as the disease does not have a cure and its complications increase with increasing duration of the disease.

Methodology: The study was done on a questionnaire based interview where 119 subjects were taken. Questions were related to the cost of treating diabetic retinopathy, its direct and indirect cost.

Result: A total of 119 subjects where 61% were male and 39% were female. The mean age was 61.93 years. The average direct cost yearly was Rs 15,907.56 and the average indirect cost yearly was Rs 88214.28.

Conclusion: The presence of diabetic retinopathy was associated with direct and indirect cost, so preventing progression of diabetic retinopathy may reduce the economic burden. Diabetic Retinopathy is a chronic eye disease that has numerous ocular manifestations. The cost of diabetic retinopathy can be a major burden as the disease does not have a cure and its complications increase with increasing duration of the disease. This was seen in our study, a presence of diabetic retinopathy was associated with direct and indirect cost, so preventing progression of diabetic retinopathy may reduce the economic burden.

KEYWORDS :

INTRODUCTION

Diabetes mellitus is a major cause of avoidable blindness in both the developing and the developed countries. Patients with diabetic retinopathy are 25 times more likely to become blind than non-diabetics. Good glycaemic control arrests the development and progression of DR and decreases the visual loss. Technological advances have improved the diagnostic accuracy of screening methods and access of the diabetic patients to the specialist care. In the last three decades, the treatment strategies have been revised to include, besides laser photocoagulation, early surgical interventions and pharmacotherapies. The aim of this review was to outline the magnitude of the problem of DR in India with the current strategies to manage it.^[1]

According to WHO Diabetic retinopathy (DR), a major microvascular complication of diabetes, has a significant impact on the world's health systems. Globally, the number of people with DR will grow from 126.6 million in 2010 to 191.0 million by 2030, and we 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. Despite growing evidence documenting the effectiveness of routine DR screening and early treatment, DR frequently leads to poor visual functioning and represents the leading cause of blindness in working-age populations. DR has been neglected in health-care research and planning in many low-income countries, where access to trained eye-care professionals and tertiary eye-care services may be inadequate. Demand for, as well as, supply of services may be a problem. Rates of compliance with diabetes medications and annual eye examinations may be low, the reasons for which are multifactorial. Innovative and comprehensive approaches are needed to reduce the risk of vision loss by prompt diagnosis and early treatment of VTDR.^[2]

In developed nations diabetic retinopathy is the most frequent microvascular complication and the most common cause of blindness in the working-age population. In the next 15 years, the number of patients suffering from diabetes mellitus is expected to increase significantly. Additionally, regular ophthalmic exams are mandatory for detecting ocular complications and initiating treatments such as laser photocoagulation in case of clinically significant diabetic macular edema or early proliferative diabetic retinopathy. In this way, the risk of blindness can considerably be reduced. In advanced stages of diabetic retinopathy, pars-plana vitrectomy is performed to treat vitreous haemorrhage and tractional retinal detachment. In recent

years, the advent of intravitreal medication has improved therapeutic options for patients with advanced diabetic macular edema.^[3]

Diabetic retinopathy (DR) is the most common complication of diabetes mellitus. It has been seen that those patients having DR are 25 times more at risk of blindness than a non-diabetic individual. Timely diagnosis with the help of better screening and referral facilities, strict control of systemic parameters and timely intervention in the form of medical and surgical intervention can delay the sight-threatening complication of DR. It has been estimated that 30% of people with DM have DR worldwide. A pooled analysis of 35 studies showed that the overall prevalence of DR of any severity is 34.6% and the prevalence of proliferative diabetic retinopathy (PDR) and diabetic macular edema (DME) is 6.96% and 6.81% respectively. The presence of diabetic retinopathy is directly proportional to the duration of DM. Seoul metropolitan city diabetes prevention programme study estimated that 55.2% of patients had DR with more than 10 years of DM as compared to 12.6% with less than 10 years of DM with an approximately three-fold increase in the vision-threatening DR in patients with more than 10 years of DM. The prevalence of DR in India is approximately 5.6 million. There may be 2.9 million people with mild non-proliferative diabetic retinopathy (NPDR), 2.2 million people with moderate NPDR, 111,258 people with severe NPDR and 296,688 people with PDR. The prevalence rate of DR in type 2 DM was reported as 34.1% from south India. Chennai urban rural epidemiology study estimated that the overall prevalence of DR in urban population to be 17.6%. Several reports suggest that Indians with type 2 DM may differ from their European counterparts in many aspects, including younger age of onset, obesity, insulin resistance and genetic predisposition.

Types Of DR.

Non-proliferative DR

1. Microaneurysm:

The earliest clinically observable lesion in DR is microaneurysm which is small outpouching of the retinal capillaries in the inner nuclear layer. They are clinically visible when the size is more than 30µm and the upper limit is 125 µm.

2. Intraretinal Hemorrhages:

Appear secondary to rupture of microaneurysms, capillary or venules and can be dot hemorrhage which are seen in outer plexiform and inner

nuclear layer. Blot hemorrhages are seen in inner plexiform and outer plexiform layer of the retina and have less distinct margins as compared to dot hemorrhage. Flame shaped hemorrhages occur in the superficial nerve fibre layer. Intra-retinal hemorrhages are seen scattered throughout the posterior pole and resolves in 4-6 months.

3. Hard Exudates:

Comprise of accumulated and condensed plasma made of serum lipoproteins in the outer plexiform layer and appear as creamy yellow plaque, flecks or dots and have affinity toward macula.

4. Cotton Wool Spots:

They are consequence of capillary occlusion in the nerve fibre layer and appear like a fluffy white cotton wool like lesion. They are almost always seen around the major vascular arcade.

5. Venous changes:

Venous dilatation and tortuosity and beeding, looping and sausage like segmentation of veins may be seen.

6. Intra Retinal Microvascular Abnormalities (IRMA):

IRMA are dilated capillaries running between arteriole and venule adjacent to capillary non-perfusion area and acts as collaterals channels Venous changes, IRMA and multiple cotton wool spots are indicators of retinal ischemia and increase the probability of progression from non-proliferative to proliferative diabetic retinopathy.

Proliferative DR

This stage is characterized by formation of new vessels from the surface of the retina and optic disc due to retinal ischemia.

1. New Vessels At Disc:

NVD is seen when the area of ischemic retina is more than a quarter of the whole retina and is defined as new vessels on the disc and around the disc. These new vessels may be derived from retinal or choroidal circulation.

2. New Vessels Elsewhere:

NVE, develop from the venous sides of the capillary network adjacent to an area of ischemia. These new vessels proliferate between the internal limiting membrane and the posterior hyaloids phase and when posterior hyloid contracts it pull these fragile vessels leading to pre retinal bleed or vitreous hemorrhage. When posterior vitreous detachment occurs, it may pull the vessels along with the retina leading to tractional retinal detachment. Sometimes the fibrovascular fronds contracts and may cause a break in the retina leading to combined tractional hematogenous retinal detachment. In cases of severe retinal ischemia there may be development of rubeosis iridis leading to neovascular glaucoma.

Note:- The aim of this study was to distribute a questionnaire and to find out the average burden of finance in patient with diabetic retinopathy.

METHODOLOGY

- **Study Design:** cross-sectional descriptive study
- **Study Set Up:** Dehradun, Uttarakhand
- **Study Population:** All age group Diabetic retinopathy patients
- **Study Duration:** October 1st 2016- April 30th 2018

METHODOLOGY-

Prior permission was taken from the authors to use the questionnaire. A direct survey method was conducted where the participants had filled the questionnaire. Our study tries to find out the yearly cost of the individual which he/she incurs to comply with the individual which he/she incurs to comply with the treatment of diabetic retinopathy. The cost was mainly divided into two headings direct cost and indirect cost.

Direct cost mainly consists of cost of spectacles, cost of medicines, cost of investigating procedure undergone, cost of lasers sittings for ophthalmological complication and cost of lasers sittings for ophthalmological complication and also for surgical intervention which has been done. Indirect cost mainly depends incurred by patients for travelling to the doctor, if he undergoes any diet control sessions for control of diabetes and how much money he/she losses from his salary in order to give his working time for the treatment of diabetes^[4].

About Questionnaire:

Questionnaire contained 18 questions, which included demographic details, General Questionnaire, Clinical Questionnaire and Expenditure Questionnaire of the participant.

Patient Questionnaire

The first stage of collected the general information or demographic data of the patient like name, address age and sex. It also contains information regarding diabetes like the medical centre attending, units of insulin taken, no of medication taken. It also contains question which gives social information like occupation & monthly income.

General Questionnaire

The general questionnaire contains question directly related to diabetes and life style. It tells us the years of diabetes the patient is having. The no of medical centres the patient has attended for ocular health & it also asks about any physical activity which the patient does to encounter diabetes.

Clinical Questionnaire

The clinical question was asked about the no of lasers sitting the patient has undergone for diabetic retinopathy treatment, no of surgical procedures undergone, no of glass changes the patient has done & how frequently the blood sugar get checked.

Expenditure Questionnaire

The question in this part was framed taking consideration of expenditure the patient has done on various heading so the question of expenditure was divided into two main headings direct & indirect cost.

Direct Cost:

The question in the direct cost consists of cost relating to the change of spectacles, cost of medicines, cost of investigating procedure undergone and cost of lasers sittings undergone for ophthalmological complications, cost of surgical procedure undergone.

Indirect Cost:

The question in the indirect cost consists of cost relating to travelling expenses which he has undergone for visiting to doctors, cost of the diet control packages he has undergone, cost which occurs for the loss of wages which the patient has lost to be compliant with the treatment of DR.

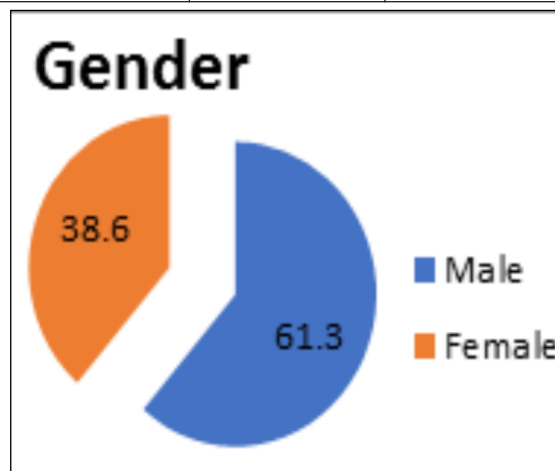
From the questionnaire we tried to find out the average burden of patient by economic classification which gives a score to the patient according to its occupation and per capita income per month. The study is to estimate the direct indirect medical costs based on the actual expenses incurred, which was retrieved from the hospital administrative data.

RESULTS

A total of 119 subjects where 61% were male and 39% were female. There means age was 61.93 years.

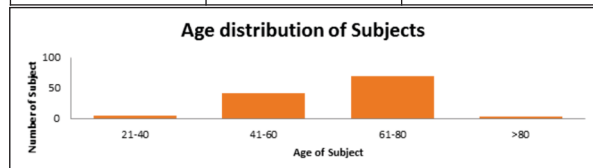
1. Gender Wise Distribution Of Patients.

Gender	Number of Patients	Percentage (%)
Male	73	61.3
Female	46	38.6



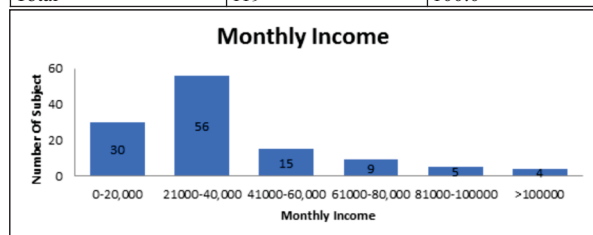
2. Age Wise Distribution Of Patients.

Age group	Number of patients	Percentage (%)
21-40	5	4.2
41-60	41	34.4
61-80	70	58.8
>80	3	2.5
Total	119	100.0



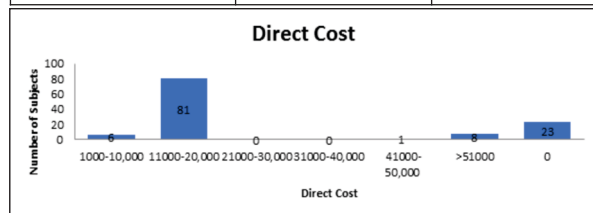
3. Monthly Income Wise Distribution.

Monthly Income	Number of patients	Percentage (%)
0-20,000	30	25.2
21000-40,000	56	47.0
41000-60,000	15	12.6
61000-80,000	9	7.5
81000-100000	5	4.2
>100000	4	3.3
Total	119	100.0



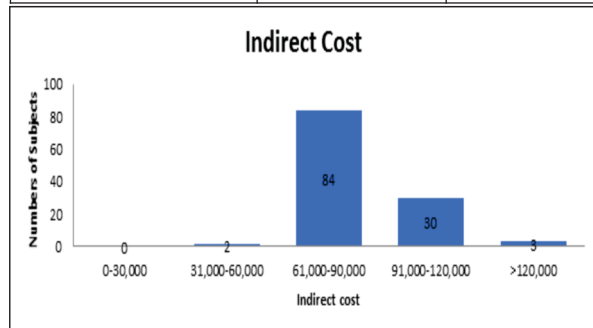
4. Distribution Of Patients With Respect To Average Annual Direct Cost.

Total direct cost group	Number of patients	Percentage (%)
1000-10,000	6	5.0
11000-20,000	81	68.0
21000-30,000	0	0.0
31000-40,000	0	0.0
41000-50,000	1	0.8
>51000	8	6.7
0	23	19.3
Total	119	100.0



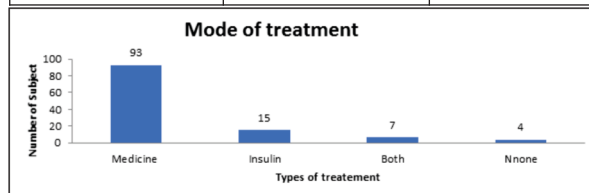
5. Distribution Of Patients With Respect To Indirect Cost.

Total Indirect Cost Group	Number Of Patients	Percentage (%)
0-30,000	0	0.0
31,000-60,000	2	1.6
61,000-90,000	84	70.5
91,000-120,000	30	25.2
>120,000	3	2.5
Total	119	100.0



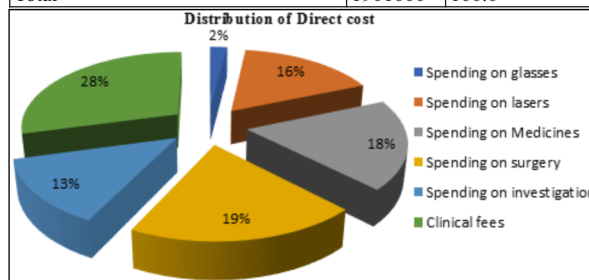
6. Distribution Of Mode Of Treatment

Mode Of Treatment	Number Of Patients	Percentage (%)
Medicine	93	78.1
Insulin	15	12.6
Both	7	5.8
None	4	3.3
Total	119	100.0



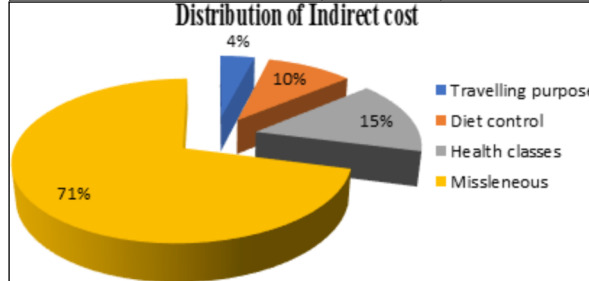
7. Distribution Of Direct Cost

Distribution Of Direct Cost	Total Cost	Percentage (%)
Money Spent for Spectacles	50,000	2.6
Money Spent for Laser	315000	16.5
Money Spent for Surgical Procedure	360000	18.9
Money Spent for Medicines	362000	19.0
Money Spent for Clinical fee	264500	13.9
Money Spent for Investigative Procedures	549500	28.9
Total	1901000	100.0



8. Distribution Of Indirect Cost

Distribution of Direct cost	Total cost	Percentage (%)
Travelling purpose	125500	1.2
Diet control	846000	8.3
Health classes	971500	9.6
Miscellaneous	7254000	71.8
Total	10096000	100



9. Distribution Of Patients With Respect To Average Annual Cost.

Annual Cost	Mean ± Standard Deviation	p-value
Direct cost	15563.02521± 13463.78611	0.05
Indirect cost	83449.57983± 15959.61468	0.05

CONCLUSION:-

By using 2 independent sample t-test p-values > 0.05 therefore there is no significant difference between total direct cost.

DISCUSSION

- In this study, the average spend direct cost yearly was Rs 15,907.56 and the average indirect cost yearly was Rs 88,214.28.
- Chandra P et al in their study found that the cost of managing diabetes was a significant proportion of the patients' income, especially for those on lower socio-economic scale.
- In this study is to estimate the direct indirect medical costs based on the actual expenses incurred, which was retrieved from the eye hospital administrative data. We also evaluate the association of the cost with the presence and severity of DR.

REFERENCES

1. Singh R et al study on Diabetic retinopathy: An update, Indian J Ophthalmol. 2008 May-Jun; 56(3): 179-188.
2. Yingfeng Zheng, Mingguang He, and Nathan Congdon. The worldwide epidemic of diabetic retinopathy, Indian J Ophthalmol. 2012 Sep-Oct; 60(5): 428-431. doi: 10.4103/0301-4738.100542.
3. Martin M Nentwich and Michael W Ulbig. Diabetic retinopathy - ocular complications of diabetes mellitus, World J Diabetes. 2015 Apr 15; 6(3): 489-499. Published online 2015 Apr 15. doi: 10.4239/wjd.v6.i3.489.
4. Pablo Chandra, Bageshri Gogate, Parikshit Gogate, Nilesh Thite. Economic Burden of Diabetes in Urban Indians, Open Ophthalmol J. 2014; 8: 91-94. Published online 2014 Dec 31. doi: 10.2174/1874364101408010091.
5. Happich M, Reitberger U, Breitscheidel L, Ulbig M, Watkins J. The economic burden of diabetic retinopathy in Germany in 2002, Graefes Arch Clin Exp ophthalmol. 2008 Jan; 246(1):151-9. Epub 2007 Apr 4.
6. Xiao Zhang, Serena Law, Neelam Kumari, Liexun Wang, Keveb Ang. Direct medical cost associated with diabetic retinopathy severity in type 2 diabetes in Singapore. PLoS One. 2017; 12(7): e0180949. Published online 2017 Jul 10. doi: 10.1371/journal.pone.0180949.
7. Kent H Summers, Gina J Ryan. The Economic Impact of Diabetic Retinopathy and the Promise of Emerging Therapies, ACPE Universal Program Number is 383-999-07-002-H01.
8. PR Harper, MG Sayyad, V de Sema. A system modelling approach for prevention and treatment of diabetic retinopathy, European Journal of Operational Research 150(2003)81-91.
9. Neeti Gupta, Rohit Gupta. Diabetic Retinopathy – An Update, JIMSA Jan. - Mar. 2015 Vol. 28 No. 1.
10. Salil S Gadkari, Quresh B Maskati, and Barun Kumar Nayak. Prevalence of diabetic retinopathy in India: The All India Ophthalmological Society Diabetic Retinopathy Eye Screening Study 2014, Indian J Ophthalmol. 2016 Jan; 64(1): 38-44. doi: 10.4103/0301-4738.178144 PMID: PMC4821119 PMID: 26953022 Prevalence.