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Socio demographic profile of glaucoma patients and barriers to treatment compliance

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ABSTRACT

Aims: The purpose of this study is to assess the economic burden of long term glaucoma therapy on chronic glaucoma patients with the objectives to inquire regarding socio-economic status of the glaucoma patients; the number, cost and duration of use of glaucoma medications by these patients and compliance to treatment.

Materials and Methods: This was a cross-sectional study conducted at our tertiary care centre where 100 consecutive patients on medical therapy, following up at our glaucoma service for atleast 6 months were recruited. The patients had been diagnosed as glaucoma, following slit-lamp biomicroscopy, fundus examination using +90 D lens, applanation tonometry, gonioscopy, and perimetry (Humphrey Field Analyzer).

Observations: A total of 55 (55%) patients were compliant to glaucoma medication. On evaluating the association of compliance with different sociodemographic factors higher cost of medication (>Rs 1000), Lower Middle/Lower socioeconomic status and Hindus were found to be significantly associated with low compliance.

Conclusion: Simplification of the treatment regimen and tailoring it to the patient's routine are a must. Follow-up visit reminders with proper tracking of patients must be taken care of.

1. Introduction

Glaucoma was derived from the Greek term 'glaukoma' meaning cataract or opacity of the lens which implied the lack of understanding of this disease process and was recognized as a disease entity in the 17th Century.[1] It is estimated that there are more than 60 million cases of glaucoma worldwide and it will increase to 80 million by 2020.[2]

The estimated prevalence of glaucoma is 2.65% in people above 40 years of age. Overall glaucoma is the second major cause of blindness after cataract and refractive errors. It is estimated that more than 3 million people world-wide are blind due to glaucoma.[3] The blindness caused for this disease is irreversible[4] being possible to prevent it through drug treatment with the use of eye drops or surgical intervention. Normally, the first line of treatment is the drug therapy.[5]

The burden of glaucoma therapy is majorly borne by the government or medical insurances in the developed nations which is not so for the developing countries since there are still very few studies on the cost of glaucoma in these countries.[6] However, it has been observed that developing nations are disproportionately burdened with blindness, with a resulting decrease in productivity and care costs, further limiting the economic resources of these societies.[7] It has been described that financial burden increases with the increase in severity of the disease.[8,9]

Quality of life, standard of health and comfort, has an inverse association with glaucoma, its resultant visual impairment, and economic burden of its treatment.[10–12] It is important to know how much each patient spends on the treatment of their disease and accurately measure the impact on their monthly income in our country.

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The purpose of this study is to assess the economic burden of long term glaucoma therapy on chronic glaucoma patients with the objectives to inquire regarding socio-economic status of the glaucoma patients; the number, cost and duration of use of glaucoma medications by these patients and compliance to treatment.

2. Materials and Methods

This was a cross-sectional study conducted at our tertiary care centre where 100 consecutive patients on medical therapy, following up at our glaucoma service for atleast 6 months were recruited. The patients had been diagnosed as glaucoma, following slit-lamp biomicroscopy, fundus examination using +90 D lens, applanation tonometry, gonioscopy, and perimetry (Humphrey Field Analyzer).

Data was analyzed using SPSS version 15.0. Data has been represented as numbers and percentages. Associations were evaluated in terms of odds ratio and tested using chi-square. Impact of age, gender, type of glaucoma, place of residence, religion, number of drugs used, expenditure distribution, socio-economic status, knowledge about disease and systemic illness on compliance was evaluated.

3. Observation and Results

The study included 100 patients among whom, 44 (44%) were males and 56 (56%) were females. The maximum number of patients were in their 5^{th} to 6^{th} decade of life amounting to 42 (42%). 33 (33%) patients belonged to urban areas and 67 (67%) to rural areas. Out of 100 subjects, 49 patients had primary open angle glaucoma, 36 patients had primary narrow angle glaucoma, 9 patients had neo-vascular glaucoma and 6 patients were with secondary glaucoma.

The socio-economic class distribution of the patients was according to the Kuppuswamy Scale modified in 2018.[13] Maximum number of patients were in the Upper Lower class amounting to 52 patients (52%).

49 patients (49%) were instilling two anti-glaucoma drugs, 24 patients (24%) were instilling one anti-glaucoma drug, 22 patients (22%) were instilling 3 anti-glaucoma drugs and 5 patients (5%) were instilling 4 anti-glaucoma drugs.

46 of 100 patients were spending Rs.1 to Rs.500 on anti-glaucoma therapy, 45 patients were spending Rs.501 to Rs.1000 on anti-glaucoma therapy and 9 patients were spending Rs.1001 to Rs.1500 on anti-glaucoma therapy.

31 patients spending between Rs.501 to Rs.1000 on anti-glaucoma drugs belonged to upper lower class whereas 3 patients belonging to the lower class were spending Rs.1001 to Rs.1500 on anti-glaucoma therapy. ($p<0.001$). Alpha agonists (77%) were most commonly used by the glaucoma patients overall followed in frequency by beta blockers (57%), carbonic anhydrase inhibitors (45%), pilocarpine (13%) and a prostaglandin analogue (2%). Patients using timolol maleate alone, spent Rs.45-60 per month, prostaglandin analogs costed Rs.150-200 per month, an alpha agonist Rs.140-150 per month, pilocarpine Rs.40-50 per month and those using carbonic anhydrase inhibitors spent Rs.300-350 per month.

A total of 55 patients were compliant to glaucoma medication. Out of 44 males 21 (47.7%) were compliant and out of 56 females 34 (60.7%) were compliant. ($p= 0.195$)

Among the 100 patients 9 patients were in the age group of 31-40 years in which only 4 patients (44.4%) were compliant to glaucoma medication, 20 patients in the age group of 41-50 years among them only 11 were compliant (55%), while in the age group of 51-60 years 42 patients were there and 26 (62%) were compliant, the age group of 61-70 years consisted of 18 patients and 8 (44.4%) of them were compliant to glaucoma medication, 11 patients were in the age group of 71-80 years and 5 patients (45.4%) among them were compliant to glaucoma medication, In the age group of 81-90 years there was only 1 patient and was compliant (100%) to glaucoma medication. ($p=0.665$).

On the basis of type of glaucoma, 29 (59%) of 49 open angle glaucoma patients, 17 (47.2%) of 36 narrow angle glaucoma patients, 5 (55.5%) of 9 neovascular glaucoma patients and 4 (66.6%) of 6 secondary glaucoma patients were found to be compliant. ($p=0.669$). Among the 100 patients 67 patients were of rural background and 37 (55.2%) of them were compliant to glaucoma medication, while the rest 33 patients resided in urban areas and 18 (54.5%) of them were compliant. ($p=0.949$). On the basis of religion among these 100 patients there were 26 Hindu patients and 74 Muslim patients, among the Hindu patients only 19 were compliant (73%) and 36 were compliant (48.6%) among the 74 Muslim patients. ($p=0.031$).

Based on the number of drugs used by the subjects as their glaucoma therapy, 15 (62.5%) out of 24 using a single drug, 29 (59%) out of 49 using two drugs, 9 (41%) out of 22 using three drugs and 2 (40%) out of 5 using four drugs were found to be compliant. ($p=0.375$). Based on expenditure distribution 30 (65.2%) of 46 spending Rs.1-500, 23 (51%) of 45 spending Rs. 501-1000 and 2 (22.2%) out of 9 spending Rs. 1001-1500 on glaucoma medication were found to be compliant. ($p= 0.047$)

In socio-economic status, 100% compliance was observed with subjects of the upper socio-economic status, 91.7% compliance was observed in the upper middle class, 54.5% compliance in lower middle socio-economic group, 46.2% in upper lower class and 40% with the lower socio-economic group. ($p=0.015$)

Only 43 patients among the 100 had knowledge of the disease but 31 of them were compliant (72%) and the rest 57 patients who did not have any knowledge of the disease, only 24 of them (42%) were compliant to glaucoma

medication. (p=0.003).

The compliance was higher in patients without systemic disease, 38 patients among the 100 glaucoma patients didn't have any systemic disease and 23 of them were compliant (60.5%), while the rest 62 who were having systemic illness, only 32 of them (51.6%) were compliant to glaucoma medication. (p=0.384).

The compliance were higher among females as compared to males, higher in subjects in the age group of 51-60 years, rural as compared to urban, muslims as compared to hindus, in patients of POAG as compared to other glaucomas, higher in upper lower class as compared to other socioeconomic strata, those having knowledge about disease as compared to those not having knowledge about disease, higher with patients instilling two antiglaucoma drugs.

A total of 55 (55%) patients were compliant to glaucoma medication. On evaluating the association of compliance with different sociodemographic factors higher cost of medication (>Rs 1000), Lower Middle/Lower socioeconomic status and Hindus were found to be significantly associated with low compliance.

Table 1: Distribution of patients based on the total expenditure on glaucoma therapy

S.No.	Expenditure Distribution (in Rs.)	No. of patients	Percentage
1.	1-500	46 (X)	46
2.	501-1000	45 (Y)	45
3.	1001-1500	9 (Z)	9

4. Discussion

Glaucoma being the leading cause of irreversible blindness in India and the fact that there is poor glaucoma awareness among the population and under-implementation of ophthalmic services in the country acts as an add-on to the glaucoma crisis.[14,15] To counter act this situation, compliance of anti-glaucoma medication needs to be incremented. The barriers to compliance for patients with glaucoma are significant.[16]

In the present study 55% subjects showed compliance to glaucoma therapy. The non-compliance rates have been found to be varied in different countries: Israel (29%),[17] Hong Kong (63.4%),[18] Taiwan (75.8%),[19] Saudi Arabia (19.4%),[20] and Pakistan (65.5%).[21] Patel and Spaeth reported that 59% of glaucoma patients were not strictly compliant.[22] A noncompliance rate of 75.2% was reported among Oman glaucoma population in 2005.[23] India being a developing nation with most of the patients without having any health insurance coverage, cost of the glaucoma medication is a major cause of non-compliance. However, forgetfulness is also one of the leading cause.[24] Lower compliance is usually seen in older patients which could be mostly due to lack of family support and diminished vision,[25] as per data supported by JE Stryker et al in 2010,[26] J Lunnela et al in 2010[27] and S. Deokule et al in 1979.[28]

In our study, the females (60.7%) were found to be more compliant with the glaucoma therapy as compared to males (47.7%). In a study done by Nahla et al.,[29] the female group, 78 patients (54.6%) were found to be compliant. In the male group, 126 patients (42.4%) were found to be compliant. In a study by Kim et al.[30] 68.9% males and 77.0% females were compliant to glaucoma medication.

In our study, higher non-compliance (44.4%) was found in 31-40 and 61-70 years age group. In a study conducted by Tripathi et al.[31] higher non-compliance (38%) was reported in the age group of 61-7 years. Patients showed good compliance in age group below 50 years (66.17% of compliant patients), while 60.59% of noncompliant group aged above 50 years, in a study done by Nahla et al.[29]

Kim et al.[30] in their study found out that 74.3% normotensive glaucoma, 65.9% angle closure glaucoma and 69.9% open angle glaucoma patients were compliant to glaucoma medication, where as in the present study 59% patients with open angle, 47.2% with angle closure and 66.6% patients with secondary glaucoma were compliant to glaucoma medication.

In our study, 55.2% of the rural population was compliant with the glaucoma therapy whereas according to Tripathi et al.[31] 60.1% of urban population was compliant with the glaucoma therapy. Compliance to one drug regimen in a study conducted by Misra et al.[32] was 72% which dropped to 24% in two drug regimen whereas in our study, compliance with one drug regimen was 62.5 which dropped to 59% on two drugs, 41% on three drugs and 40% on four drug regimen.

Upon analyzing the effect of the level of education upon compliance Nahla et al.,[29] found a statistically and highly significant difference in compliance ($p < 0.0001$) between educated and non-educated patients, with the highest percentage of non-compliant patients (41.5%) falling in the non-educated (illiterate) group and the highest percentage of compliant patients (69.6%) falling in the group who finished high school and university graduates. In our study also, higher compliance was seen with subjects belonging to higher socio-economic status.

In this study we found out that 51.6% patients with underlying systemic disease and 60.5% patients without any systemic disease are compliant to glaucoma medication. In the study by Kim et al.[30] they found out that 70.3% patients with underlying systemic disease and 73.8% patients without any systemic disease are compliant to glaucoma medication.

In our study, 72% of those who had knowledge about the disease were compliant and 42% of those who did not have knowledge about the disease were compliant. In a study by Nahla et al.,[29] 46.4 % of the patients who had knowledge about the disease were compliant and 53.6 % of

Table 2: Distribution of patients based on socio-economic status in terms of total expenditure incurred by the patients

S.No.	Socio-Economic Status	X (n=46)	Y (n=45)	Z (n=9)	Statistical significance
1.	UPPER (n=4)	1	0	3	
2.	UPPER MIDDLE (n=12)	8	2	2	
3.	LOWER MIDDLE (n=22)	9	12	1	c2=38.9; p<0.001
4.	UPPER LOWER (n=52)	21	31	0	
5.	LOWER (n=10)	4	3	3	

Table 3: Association of demographic and clinical factors with compliance

	Factor	Number	Compliant	% Compliance	Significance of association
1.	Gender				
	Male	44	21	47.7	c2=1.68; p=0.195
	Female	56	34	60.7	
2.	Age				
	31-40	9	4	44.4	
	41-50	20	11	55	
	51-60	42	26	62	c2=3.23; p=0.665
	61-70	18	8	44.4	
	71-80	11	5	45.4	
	81-90	1	1	100	
3.	Type of Glaucoma				
	POAG	49	29	59	
	PNAG	36	17	47.2	c2=1.56; p=0.669
	Neovascular	9	5	55.5	
	Secondary	6	4	66.6	
4.	Place of residence				
	Rural	67	37	55.2	c2=0.041; p=0.949
	Urban	33	18	54.5	
5.	Religion				
	Hindu	26	19	73	c2=4.64; p=0.031
	Muslim	74	36	48.6	
6.	Number of Drugs Used				
	1	24	15	62.5	
	2	49	29	59	c2=3.11; p=0.375
	3	22	9	41	
	4	5	2	40	
7.	Expenditure Distribution (In Rs.)				
	1-500	46	30	65.2	
	501-1000	45	23	51	c2=6.12; p=0.047
	1001-1500	9	2	22.2	
8.	Socio-Economic Status				
	Upper	4	4	100	
	Upper Middle	12	11	91.7	
	Lower Middle	22	12	54.5	c2=12.3; p=0.015
	Upper Lower	52	24	46.2	
	Lower	10	4	40	
9.	Knowledge about disease				
	No	57	24	42	c2=8.91; p=0.003
	Yes	43	31	72	
10.	Systemic disease				
	Yes	62	32	51.6	c2=0.756; p=0.384
	No	38	23	60.5	

the patients who did not have knowledge about the disease were compliant.

5. Conclusion

Compliance to glaucoma treatment is a global problem that needs cooperation of physicians, media, and social care providers. More effort needs to be done by health care providers to educate our patients about the nature of glaucoma, glaucoma susceptibility, importance of treatment, follow-up visits, and effect of treatment on prognosis. More time has to be spent with the patients teaching them the correct method of instilling the drops. Simplification of the treatment regimen and tailoring it to the patient's routine are a must. Follow-up visit reminders with proper tracking of patients must be taken care of.[29]

6. Source of Funding

None.

7. Conflict of Interest

None.

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