Original Article

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Ophthalmology Section

Clinicoepidemiological Profile of Glaucoma in 18-45 Years of Age- A Descriptive Study

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ABSTRACT

Introduction: Glaucoma is a group of disorders characterised by chronic progressive optic neuropathy. The consequences of glaucoma are more severe in the young individuals because of late diagnosis and longer life expectancy. Therefore, this study was conducted to assess the clinicoepidemiological profile of glaucoma in the age group 18-45 years.

Aim: To study the demographic characteristics, clinical profile and types of glaucoma among patients in the age group of 18-45 years.

Materials and Methods: This descriptive study was conducted in Regional Institute of Ophthalmology, Glaucoma Clinic, Thiruvananthapuram, Kerala, India. Among 75 patients who presented with various types of glaucoma, in the age group 18-45 years during a period of one year from January 2018 to January 2019, after obtaining ethical clearance were included. The subjects had an Intraocular Pressure (IOP) >21 mmHg and glaucomatous optic nerve changes with corresponding visual field defects. Relevant history and comprehensive eye examination was done in all patients after obtaining consent.

Results: Majority of the patients were in the age group 26-35 years (40%, n=30). Among these patients, 41 (54.7%) were males, and 34 (45.3%) were females. The types of glaucoma seen in the present study were: 26 cases of Juvenile Open Angle Glaucoma (JOAG), 14 cases of Primary Open Angle Glaucoma (POAG), 12 cases of Primary Angle Closure Glaucoma (PACG), two cases of angle closure glaucoma in retinitis pigmentosa, five Secondary Angle Closure Glaucoma (SACG) which includes two neovasular glaucoma, one case each of iridocorneal endothelial syndrome, iris meloncytoma suspect and microspherophakia, six cases of Pigmentary Glaucoma (PG), six cases of traumatic glaucoma and four cases of inflammatory open angle glaucoma. The most common symptom reported by these patients was defective vision (50%) but 16 (21.3%) patients were asymptomatic at presentation. Family history of glaucoma was positive in 22 (29.3%) of the patients and majority was found in JOAG. Out of 133 eyes, 79 eyes had Best Corrected Visual Acutity (BCVA) >6/18, in between 6/18-6/60 in 36 eyes 16 eyes, had <6/60 and two eyes had no perception of light.

Conclusion: Periodic eye examination is warranted among the young population with positive family history of glaucoma to prevent severe visual loss and blindness.

Keywords: Angle closure glaucoma, Blindness, Intra ocular pressure, Juvenile open angle glaucoma, Optic neuropathy

INTRODUCTION

Glaucoma is a group of disorders characterised by chronic progressive optic neuropathy. It has two main subtypes: open angle and angle closure glaucoma. In India, congenital glaucoma accounts for 4.2-7% of childhood blindness [1,2], and in those of 40 years and above, around 11.2 million people are affected with glaucoma, out of which POAG affects 6.48 million people. In addition, 2.54 million people are with PACG although those with angle closure disease comprises of 27.6 million [3]. However, India still lacks data on various subtypes of glaucoma like JOAG, PG, traumatic glaucoma, inflammatory glaucoma etc., in young individuals, particularly in 18-45 years of age group.

Therefore, the present study was undertaken with an aim of understanding clinicoepidemiological profile and types of glaucoma found in the age group of 18-45 years.

MATERIALS AND METHODS

This descriptive study was conducted in Regional Institute of Ophthalmology, Glaucoma Clinic, Thiruvananthapuram, Kerala, India, among patients who presented with various types of glaucoma during January 2018 to January 2019. After obtaining the Ethical Committee clearance (No. 77/HEC/RIO TVPM), relevant history, ocular examinations and informed consent was taken.

The history included the patient's age of presentation of glaucoma, sex, education status, place, socio-economic status, chief complaint at the initial visit, duration of glaucoma at presentation, family history of glaucoma, numbers of medications used or laser or surgery done for the management of IOP, and steroid use or history of trauma to eyes or ocular surgeries prior to diagnosis of glaucoma.

The sample size was 75 patients (133 eyes) in the present study and was categorised into three groups by age at presentation of glaucoma:

Group 1: 18-25 years (22.7%, n=17)

Group 2: 26-35 years (40%, n=30)

Group 3: 36-45 years (37.3%, n=28)

Inclusion criteria: Baseline IOP >21 mmHg by Goldmann applanation tonometry at initial hospital visit, glaucomatous optic neuropathy (neural rim thinning, focal notching or a vertical cup-to-disc ratio >0.6) with corresponding glaucomatous visual field defects. An automated visual field test was evaluated by 30-2 program Swedish interactive threshold algorithm standard on the Humphrey visual field analyser. The first visual field test was excluded to minimise the impact of the learning effect. Visual field defects was staged using Hodapp Parish Anderson staging i.e., Early is MD <6 dB (decibel), moderate is MD 6-12 dB and severe is MD>12 dB. (MD=Mean deviation) [4].

Exclusion criteria

1) Age of presentation of glaucoma <18 or >45 years of age.
2) Patients who have undergone any intra ocular surgery before the onset of glaucoma.
3) Patients presenting with immediate post-traumatic IOP rise (within two weeks).

History about various symptoms such as diminution of vision, coloured haloes, pain, redness, frequent change of spectacle and headache was taken. All different types of glaucoma found in age group 18-45 years were evaluated and included in the study except congenital glaucoma.

STATISTICAL ANALYSIS

Data was entered into excel sheet. Statistical analysis was performed using appropriate statistical software (Statistical Package for the Social Sciences (SPSS) version 20.0).

RESULTS

Of all the total 75 patients, 26 JOAG were found to be in age group 18-35 years of age, 14 with open angle glaucoma in age group 36-45 years and was considered as POAG, 12 in age group 36-45 years were found to have PACG. Two patients with retinitis pigmentosa who presented with angle closure glaucoma were 32 and 34-year-old. Out of six patients with PG, five were in age group 26-35 years and one of the patient was 25-year-old. Six patients with traumatic glaucoma were found to be in age group 18-45 years. All the four patients who presented with inflammatory glaucoma were in age group 26-35 years. The patients with neovascular glaucoma were 32 and 36-year-old. Those patients who presented with angle closure glaucoma due to ICE syndrome, iris melanocytoma suspect and microspherophekia were 33, 24 and 20-year-old respectively, as shown in [Table/Fig-1].

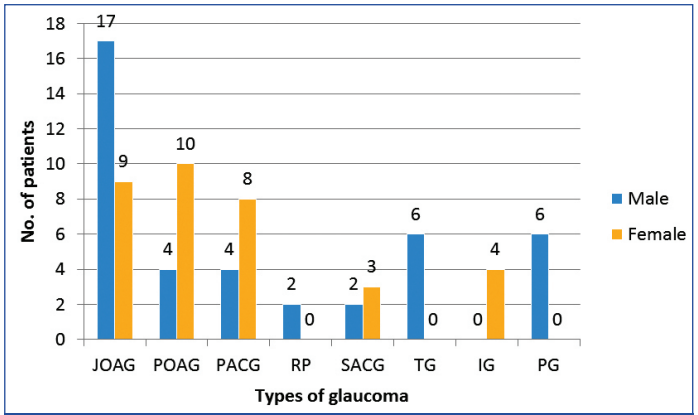
Diagnosis	18-25 years	26-35 years	36-45 years
JOAG (n=26)	13	13	0
POAG (n=14)	0	0	14
PACG (n=12)	0	0	12
Pigmentary glaucoma (n=6)	1	5	0
Traumatic glaucoma (n=6)	1	4	1
Inflammatory glaucoma (n=4)	0	4	0
Iris melanocytoma suspect (n=1)	1	0	0
Neovascular glaucoma (n=2)	0	1	1
Angle closure in ICE (n=1)	0	1	0
Angle closure in retinitis pigmentosa (n=2)	0	2	0
Angle closure in microspherophakia (n=1)	1	0	0

[Table/Fig-1]: Distribution of age among different types of glaucoma.
JOAG: Juvenile open angle glaucoma; POAG: Primary open angle glaucoma; PACG: Primary angle closure glaucoma; ICE: Iridocorneal endothelial syndrome

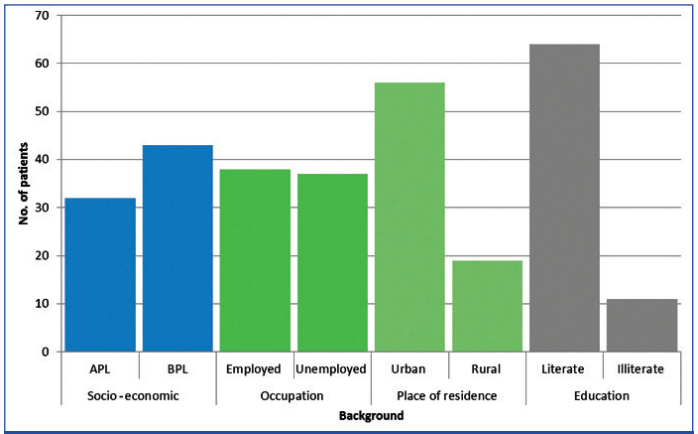
Gender distribution: From [Table/Fig-2], overall male preponderance was found, with 54.7% males (n=41) and 45.3% females (n=34).

Demographic data: In [Table/Fig-3], it is shown that 32 (42.6%) of patients belong to Above Poverty Line (APL) and 43 (57.4%) belonged to Below Poverty Line (BPL). Out of 75 patients, 38 (50.67%) were employed and 37 (49.3%) were unemployed, majority of them being students or housewives. Upto 56 (74.7%) of these patients were from urban area whereas 19 (25.3%) belonged to the rural population. Literate patients made upto 64 (85.3%) of the study group, while 11 (14.7%) were illiterate and were mostly manual labourers.

Clinical features: Over all, the most common symptoms were defective vision (50%). However, 16 (21.3%) of the patients were asymptomatic at presentation. Among which, JOAG and POAG presented with defective vision in 46.15% (n=12) and 57.14% (n=8), respectively. The PACG, though commonly known as the asymptomatic and chronic



[Table/Fig-2]: Gender distribution among different types of glaucoma.
RP: Retinitis pigmentosa; SACG: Secondary angle closure glaucoma, TG: Traumatic glaucoma, IG: Inflammatory glaucoma, PG: Pigmentary glaucoma; JOAG: Juvenile open angle glaucoma; POAG: Primary open angle glaucoma; PACG: Primary angle closure glaucoma



[Table/Fig-3]: Distribution of patients according to their background.
APL: Above poverty line; BPL: Below poverty line

nature, in the present study, patient presented with defective vision, redness, colour halos and headache.

Family history: Among 75 patients, 22 (29.3%) had positive family history. The positive family history was seen in 10 patients of JOAG, POAG five patients, PACG three patients, retinitis pigmentosa with angle closure glaucoma two patients and one patient each of iris melanocytoma suspect and microspherophekia.

Visual acuity: In the present study, BCVA were found as follows >6/18 in 79 eyes, in between 6/18-6/60 in 36 eyes, <6/60 in 16 eyes. No perception of light was observed in the two patients with neovascular glaucoma.

Refractive error: Myopia was observed in 61.5% (n=16) of JOAG, 85.7% (n=12) of POAG, 100% (n=6) in PG and 33.3% (n=2) of traumatic glaucoma. Whereas hyperopia was seen in 91.6% (n=11) of PACG, 20% (n=1) of SACG, 100% (n=2) of retinitis pigmentosa, 33.3% (n=2) of traumatic glaucoma and 75% (n=3) of inflammatory glaucoma.

Intraocular pressure: The JAOG presented with higher baseline IOP followed by POAG and other types of glaucoma also had high baseline IOP [Table/Fig-4].

Diagnosis	Mean±SD IOP (mmHg)
JOAG	33.17±5.22
POAG	32±1.7
PACG	27.3±4.2
SACG	28.9±2.39
Pigmentary glaucoma	30.6±2.6
Traumatic glaucoma	30.5±2.69
Inflammatory glaucoma	29.27±0.60

[Table/Fig-4]: Mean baseline IOP among different types of glaucoma.
JOAG: Juvenile open angle glaucoma; POAG: Primary open angle glaucoma; PACG: Primary angle closure glaucoma; SACG: Secondary angle closure glaucoma

Gonioscopy: Out of 133 eyes, 93 (69.9%) were open angles, 36 (27.1%) were closed angles and 4 (3%) had angle recession.

Visual field: Visual field assessment showed early defects in 58 (43.6%), moderate defects in 63 (47.4%), severe defects in 10 (7.5%) and 2 (1.5%) eyes were blind. In the present study, JOAG showed mostly early to moderate visual field defects. Two patients each in POAG, PACG, and angle closure glaucoma in RP presented with severe visual field defects.

Treatment: Over all, up to 65 (86.7%) of the patients were controlled with medical treatment alone, 12 (16%) received laser treatment and all of which were PACG and 10 (13.3%) of the patients underwent trabeculectomy with mitomycin. Those patients who underwent surgical intervention were five patients of JOAG, two patients of POAG, two patients of PACG and one patient of traumatic glaucoma.

DISCUSSION

Juvenile Open Angle Glaucoma

In this study, JOAG comprised of major group with a male preponderance (65.4%) similar to studies conducted by Gupta V et al., (79%), and Kwun Y (64%) [5,6]. The age distribution of JOAG in this study (average age 25.8±5.1; range 18-35) was comparable with previous studies among Indian (average age 26.8±6.1 years; range 10-40) [5], and Koreans 26.8±7.3 years [6]. Family history of glaucoma was observed in 38.4% (n=10) and was comparable to the study by Kwun Y et al., where 28% positive family history was reported [6], while in a study conducted by Yeung HH and Walton DS the family history was found to be relatively high i.e., 60% [7]. This discrepancy was because in latter study number of patients studied were only 10. The JAOG follows an autosomal dominant pattern of inheritance and most commonly involves the myocilin protein. Around 61.5% were found to be myopic, which corresponds to a study by Lotufo D et al., where up to 73% were myopic [8]. The mean baseline IOP was high (33.17±5.22 mmHg), similar to previous studies in India, Korea and Turkey which shows IOP of 35.3±14.9 mmHg, 36.6±10.8 mmHg and 30.08±4.3 mmHg, respectively [5-7].

In this study, decreased vision was the common symptom, which was comparable to a study by Kwun Y et al., where 1/3rd of the patients were asymptomatic and blurred vision was found as most common manifestation (22%) [6]. Gonioscopy showed normal appearing open angle in (70%) (n=18) cases, with few cases of prominent iris processes (20%) (n=5) and high iris insertion (10%) (n=3), similar to a study by Furuyoshi N et al., where nine of the 11 patients had no abnormalities on gonioscopy [9]. Only two out of 11 patients had high iris root insertions and absence of the angle recess on clinical examination, but had no evidence of iridodysgenesis or corneodysgenesis. Up to 80.8% patients' IOP were controlled on multiple topical anti-glaucoma medication, while 20.2% had undergone surgery. In a study by Gupta V et al., medical therapy alone could control IOP and prevent glaucomatous progression in 52% over a 5-year follow-up [5]. However, Wiggs JL et al., found that 83% required surgical treatment which maybe because of inclusion of secondary glaucomas [10]. Jacobi PC et al., found trabeculectomies performed on young patients with JOAG to have successful outcomes in contrast to results found by Yalvac IS et al., [11,12]. Therefore, intraoperative antifibrotics such as mitomycin C (MMC) should be use in an attempt to prevent fibrosis.

Primary Open Angle Glaucoma (POAG)

The POAG shows an increasing trend with age, however early onset POAG was found to be the 2nd largest group in the present study i.e., 18.66% (n=14)). Up to 71.4% (n=10) of patients were female while 28.6% (n=4) were male. Some studies have shown no gender difference in POAG, while others have reported women and men, each showing higher prevalence at different studies [13-15].

Positive family history of parents were seen in 35.7% (n=5) of patients, higher than the Baltimore eye survey where 16.1% cases had positive family history, among first-degree relatives and were higher in siblings [16].

Myopia were seen in 85.7% (n=12) which corresponds to the blue mountains eye study where a strong relationship between POAG and myopia was found, and the beaver Dam eye study showed, persons with myopia were 60% more likely to have glaucoma than those with emmetropia [17,18]. The mean baseline IOP for POAG in this study was 32±1.7 mmHg, which was higher in contrast to a study in rural South Indian population where only 32.81% of subjects presented with an IOP >21 mmHg [19].

Primary Angle Closure Glaucoma (PACG)

The PACG is associated with increasing age, however 16% (n=12) of patients meeting the criteria of PACG were found in the present study. The youngest being a 36-year-old woman and the rest 11 were in between 40-45 years of age. The 36-year-old woman was diagnosed as PACG despite the young age as no secondary cause was found.

The prevalence of angle closure and angle closure glaucoma is known to be higher among women in previous studies [20,21]. Similarly, in this study also women (66.6%, n=8) were more affected than men (33.4%, n=4). The association of PACG with hyperopia has been suggested previously likewise in this study also 91.6% of patients had hyperopia, while 8.4% of them had no refractive error [22]. The mean baseline IOP was found to be 27.3±4.02 mmHg. The Chennai glaucoma study and rural South Indian population mean IOP of angle closure disease were found to be 26.0±14.9 mmHg and 20.71±9.24 mmHg, respectively [20,21]. However, the mean IOP may not be comparable because in latter studies they have included PACS, PAC and PACG. The symptoms were decrease vision, eye ache, redness and headache in decreasing order, unlike the asymptomatic and chronic nature of disease as seen in previous studies in India [14,20,21].

Retinitis Pigmentosa

Two retinitis pigmentosa patients presented with features of acute angle closure glaucoma. Both were male and were 32 years and 34-year-old. In a study conducted by Peng T et al., it was found that the risk of acute angle closure in RP was higher in patients under the age of 60 years, particularly male patients [23]. It was also found that the angle closure glaucoma was the predominant form (93.8%) in retinitis pigmentosa patients with co-existent glaucoma [23]. In this study, both patients had acute presentation of pain with raised IOP of 36 mmHg and 42 mmHg in affected eyes. An acute highly elevated IOP or absolute glaucoma was also reported by Gartner S and Schlossman A and was observed to be the common presenting features [24].

Secondary Angle Closure Glaucoma (SACG)

In the present study, both the patients with neovascular glaucoma were in their 30's, an unusually young age for neovascular glaucoma to develop, unlike previous studies where older patients were commonly affected [25]. The cause of the neovascular glaucoma in the present study was due to chronic anterior uveitis and ocular ischaemic syndrome due to left internal carotid artery occlusion with systemic hypertension. In most cases, the pathogenesis of neovascular glaucoma is posterior segment ischaemia secondary to proliferative diabetic retinopathy or central retinal vein occlusion. Another SACG observed was a 33-year-old female with iridocorneal endothelial syndrome. She presented with decreased vision as major complaint. On ocular examination, IOP was 26 mmHg, anterior segment examination showed marked atrophy of iris and corectopia. Gonioscopy showed broad based PAS in almost 180°. Glaucomatous optic disc changes with corresponding moderate visual field defects were seen. The patient was on multiple topical

anti-glaucoma medication. In one study, out of 223 eyes with ICE syndrome, 70% were found to have glaucoma and intraocular pressure was 24 mmHg. Seven eyes developed glaucoma during the follow-up period, increasing the percentage to 73%. The IOP was managed medically in 81 eyes (50%) and the other 82 eyes (50%) required surgical intervention [26].

Another patient was a case of iris melanocytoma suspect with secondary glaucoma. A 24-year-old man presented with non specific complaint about some discolouration inside his left eye. His BCVA was 6/6. On ocular examination with slit lamp, a lower nasal iris mass, measuring approximately 5×5 mm was noted. Ultrasound biomicroscopy revealed the mass extending behind the iris in the ciliary body. The IOP was 28 mmHg in affected eye. In one study, secondary glaucoma occurred in 11% at 5 years and growth was observed in 23% at 5 years but no malignant transformation was found [27].

Another case was a 20-year-old man who had microspherophakia with secondary angle glaucoma in both eyes. He presented with defective vision and family history of his father having same condition. On ocular examination, bilateral small diameter of lens and equator of lens was visible with full mydriasis. His refractive status was hypermetropia and IOP was 26 mmHg and 28 mmHg in both eyes respectively. There were no associated ocular or systemic disorders. It is known that familial microspherophakia is not associated with systemic abnormalities. Glaucoma is found to be common in microspherophakia and has been reported in up to 51% of patients and probability of developing glaucoma increases with age [28].

Pigmentary Glaucoma (PG)

In the present study, six patients were found to have pimentary glaucoma. Five patients were in their mid-thirties, while one patient was found to be 25-year-old. Earlier studies reports that PG usually occurs in young and its incidence decreases with age [29,30].

Pigmentry glaucoma was reported to be prevalent in males [29,31]. All the patients in the present study were found to have myopic refractive status. It has been postulated that myopic eyes in PG occurs because the myopic eye develops an enlarged ciliary body ring in relation to the lens, allowing the peripheral iris to become concave and to make contact with the zonules. Bilateral involvement of eyes was found in this study while unilateral presentation was also reported in previous study [30]. The mean IOP was found to be 30.6±2.6 mmHg. In one of the study, IOP of above 30 mmHg was apparently associated with glaucomatous disc changes and visual field defects [31]. The IOP was controlled with topical antiglaucoma medication alone in all the patients.

Traumatic Glaucoma

In the present study, six patients had traumatic glucoma. All the patients examined were in between 20-40 years of age. In a study by Sihota R et al., post-traumatic glaucoma was found to affect 35.9% of glaucoma patients in less than 30 years of age, but only 1.3% of those above 30 years of age [32]. Also, the male:female ratio was reported to be 84:16, and the prevalence was more in males, which was similar to this study. More than two weeks post-trauma duration was included to avoid immediate post traumatic temporary rise of IOP, and not necessarily due to glaucoma. The mode of injury was blunt trauma in 5 (83.3%) out of six and 1 (16.7%) of the patient had penetrating injury. A study by Sihota R et al., also showed concussion injuries as responsible for the trauma in 73% and penetrating injuries in 27% [32]. Unilateral involvement of glaucoma in injured eye alone was observed. Gonioscopy showed evidence of angle recession of more than 180° in four patients.

Inflammatory Glaucoma

In the present study, four patients were found to have inflammatory glaucoma (uveitic glaucoma). In the literature, it was found that prevalence of glaucoma in the eyes with uveitis varies from 10-20%, but it can be as high as 46% in chronic uveitis [33]. In this study, the patients were all females and found to be in the age group of 30-35 years. During the time of examination, all the patients were found to have recurrent type of anterior uveitis. One out of four patients had anterior uveitis as ocular association of systemic lupus erythematous. Another one had Juvenile Rheumatoid Arthritis (JRA), whereas the other two patients had no systemic association. According to the literature, systemic association of uveities with glaucoma includes ankylosing spondylitis, syphilis, tuberculosis, sarcoidosis and JRA. The specific ocular inflammations associated with uveitic glaucoma: includes Fuch's heterochromic iridocyclitis, Possner-Schlossman syndrome, and herpetic keratouveitis [30]. Symptoms reported by patients were decreased vision, redness, colour halos and pain, atleast two of which were seen in all of them. The mean IOP was 29.27±0.60 mmHg and the reason for high IOP may be due to the presence of active inflammation during the time of examination. Gonioscopy showed open angles suggesting secondary open angle mechanism.

Limitation(s)

The limitations of present study was the small sample size and inclusion of all types of glaucoma which hinder us to study each type in detail. In future, specific type of glaucoma can be focused and study thoroughly in young individuals.

CONCLUSION(S)

In the present study, various types of glaucoma were observed. Among those, JOAG affected majority of the patients and association with male preponderance, asymptomatic nature, myopia, high baseline IOP were noted. It was followed by early onset POAG with high baseline IOP, predilection to myopia and female gender. Though, angle closure glaucoma was commonly seen in older population, PACG was found even in a 36-year-old patient. Angle closure glaucoma was also found in two cases of retinitis pigmentosa. Various other causes of secondary glaucoma were also established. Therefore, periodic eye examination is warranted in young people, especially in those with positive family history of glaucoma, to ensure early diagnosis and prevention of blindness.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Aug 03, 2021
- Manual Googling: Oct 07, 2021
- iThenticate Software: Oct 26, 2021 (10%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

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