



Survey : Aim

- Estimate prevalence of
 - POAG
 - PACG
- Estimate (If possible -----)
 - Progression of occludable angles (PACS) to Angle closure (PAC) and Glaucoma

Study population 1995

- Vellore population 300,000
- 20 clusters from all census wards
- ICMR study on coronary heart disease
- 12 clusters selected for VES

Vellore Eye Survey 1995

- Vellore population 300,000
- 12 clusters
- study population 5697
- 30-60 age group
- 1932 subjects



Vellore Eye Survey

- History
- Complete eye examination
 - Hospital
- Slit lamp
- Applanation IOP
- Gonioscopy

Complete Eye Examination

- Dilatation
- Fundus (indirect ophthalmoscopy)
- Slit lamp (exclude PXE etc)
- Disc : Stereoscopic Examination
 - glaucomatous features
 - cup : disc ratio > 0.7
 - cup:disc asymmetry ≥ 0.2
- No photographs



Automated Perimetry

- HFA 30-2
 - Suspicious Discs & / or
 - “Raised” IOP
- Not for “normals”



Diagnosis : Ocular Hypertension

- Elevated IOP (> 21 mm Hg)
- No field defects
- Open angle on Gonioscopy



Diagnosis : POAG

- Disc criteria & / or IOP > 21
- Field defect
 - Two of Anderson's criteria
- Open angle on Gonioscopy
- No secondary causes for the above findings



PACG: Diagnosis

- Acute:
 - Painful red eye, raised IOP, blurred vision, vertically oval pupil, closed angles on gonioscopy, no secondary causes
- Chronic
 - SYNECHIAL
 - APPositionAL



Diagnosis: Chronic ACG

- Synechial
 - *Occludable angles on gonioscopy with*
 - *Typical PAS, with or without*
 - Increased IOP, disc or field changes
- Appositional
 - *Occludable angles on gonioscopy with*
 - Increased IOP
 - *No PAS*
 - With or without disc or field changes



Results : Response Rate

- Target 1932 in the 30-60 age group
- 1521 could be contacted
- 972 subjects responded
- **50.3% of eligible**
- (63.9% of those contacted)



Visual Fields: HFA

- Based on clinical examination
 - Disc & or IOP criteria
- Appointments given: 169
- Fields done: 82 (48.5%)



FINAL DIAGNOSIS

- POAG: 04
 - 08 if we account for fields not done
- PACG: 42
 - Synechial 33
 - Appositional 09
- OHT: 30



Prevalence (95% CI)

- POAG 4.1/1000 (0.08 - 8.1)
 - **8/1000** if we extrapolate for missed fields
- PACG 43.2/1000 (30.14 - 56.3)
- OHT 30.8/1000 (19.8 - 41.9)

972 people examined



Limitations

- Inexperience
- Small sample
- > 60 age group not included
- 50 % response (63.9 % of contacted)
- Fields obtained in only 50 % of indicated
- PAC and PACG both defined as PACG



V E S 1995 : Re-classification

- PACS : 10.35%
- Chronic Angle Closure : 37 persons (3.8 %)
 - Synechial closure : 30 persons
 - Appositional closure : 07 persons
- Primary Angle Closure Glaucoma: 5 (0.5 %)
- POAG : 0.41 % (0.8)

that was in 1995



2000 Survey

To Determine :

- Progression of Occludable Angles to Angle **Closure**
- Progression of Angle Closure to Angle Closure **Glaucoma**



V E S : 2000

- Randomly selected 110 normals
- All persons with PACS
- All persons with PAC



History & Examination

- History with specific inquiries regarding H/O acute angle closure glaucoma
- Examination in the hospital
- Masked manner
- Ophthalmologist \geq two years experience in Glaucoma clinic



Examination

- Complete Ophthalmic examination
 - Slit lamp (Haag Streit 900)
 - Goldman Applanation tonometry
 - Stereoscopic disc examination using 60 D lens



Gonioscopy

- To maintain consistency :
 - Initial Goldmann two mirror
- Sussmann Indentation for all
- Same grading system



Ocular Biometry

- Axial length
- Anterior chamber depth
- Lens thickness

Tomey model AL 1000



Definitions

- Primary Angle Closure Suspect :
 - Filtering portion of TM visible $< 180^\circ$
 - No PAS
 - Normal IOP (IOP ≤ 21 mm Hg)
 - Normal disc
 - No field defects



Definitions : PAC

- Primary (appositional) Angle Closure :
 - Gonioscopically PACS
 - Raised IOP ($> 21\text{mm Hg}$)
 - No PAS
- Primary (synechial) Angle Closure:
 - Gonioscopically PACS
 - PAS
 - \pm raised IOP

Disc / Field changes NOT required for diagnosis

Definitions : PACG

- Primary Angle Closure
 - Appositional
 - Synechial
- AND
- Damage to
 - Disc
 - Field defects

Disc / Field changes Mandatory for diagnosis

Criteria for Progression

- Disc progression
 - Field defect not necessary for diagnosis
 - New typical Glaucomatous disc changes
 - Progression of CDR > 0.2 between two visits
- Presence of visual field defect on HFA
(2 Anderson's criteria) & correlating with glaucomatous disc changes
 - Confirmed by repeat field
- No photographs



Results: Normals

- 300 persons contacted
 - 75 changed residence
 - 23 not contactable
 - 90 did not respond
 - 01 refused examination
 - 10 expired
 - 01 hospitalized
- 110 persons examined

No significant difference between responders and non - responders

Results : Normals

- 1 developed chronic synechial angle closure
- 2 developed OHT
- 1 developed NTG
- 6 developed visually significant cataract



Results : PACS

- 118 persons
 - 82 contacted
 - 34 shifted residence
 - 02 expired
 - 03 refused
 - 29 did not respond
- 50 were re-examined

No significant difference between responders and non - responders

Results : PACS

- 38 bilateral PACS
- 12 unilateral PACS
 - 4 progressed to bilateral PACS



Results : PACS

- Progression to primary angle **closure** :
 - 11 (22%. 95% CI 9.80-34.2)
- Appositional closure : 4
- Synechial closure : 7



Results : Progression of PACS

- All bilateral PACS
- Bilateral progression in 5 of the PACS
- Unilateral progression in 6 of the PACS



Results : PACS in 2000

- Re - classified to open angle : 2
- “kappa” for PACS between the two phases of the study : .96



Results : PACS

- None developed disc and field changes *
- No blindness due to glaucoma *
- No patients with H/O of acute angle closure glaucoma *
- 3 developed visually significant cataracts

* Could be as high as 6 %



Absolute and Relative Risk

- Progression (AR) in “normals” : 0.9 %
- Progression (AR) in PACS : 22 %
- Relative Risk : $22 / 0.9 : 24.4$



Biometry : Normal vs PACS

	PACS (n = 50)	Normal (n = 110)
Axial Length	22.23 (0.76)	22.5 (0.8)
AC Depth	2.76 (0.44)	3.2(0.4)
Lens Thickness	4.48 (0.62)	4.2 (0.5)



PACS : Biometric Parameters

	Non progression			Progression			
	Mean	SD	No.	Mean	SD	No.	
Axial length	22.23	0.808	39	22.09	0.79	11	Not significant
AC depth	2.77	0.49	39	2.74	0.4	11	Not significant
Lens thickness	4.62	0.68	39	4.19	0.52	11	Not significant

No difference between groups



Results: Primary Angle Closure

- 37 persons
 - 32 contacted
 - 2 expired
 - 2 shifted residence
 - 1 refused examination
- 28 persons re-examined

No significant difference between responders and non - responders

PAC Progression : Disc & Field Criteria

- Progression to **glaucoma** (Disc and Field)
 - **8** (28.5 %, 95% CI 12.3 % - 44.6 %)
- Primary appositional angle closure glaucoma : 2
- Primary synechial angle closure glaucoma : 6



Results: Primary Angle Closure

- Bilateral PAC : 7 of 14 progressed
- Unilateral PAC : 1 of 14 progressed
- Relative risk : 7

bilateral PAC have 7 times the risk of progression to glaucoma



Results : Primary Angle Closure

- One eye previously diagnosed as appositional closure reclassified PACS
- 4 of 7 appositional closure developed synechiae



Results : Primary Angle Closure

- No blindness due to glaucoma *
- No patients with H/O of acute angle closure glaucoma *
- One blind due to Retinitis Pigmentosa
- 3 persons developed visually significant cataracts

* Could be as high as 10 %



PACG : Biometric Parameters

	Non progression			Progression			Significance level
	Mean	SD	No.	Mean	SD	No.	
Axial length	22.13	0.80	20	22.43	0.65	8	Not Significant
AC depth	2.71	0.45	20	2.6	0.2	8	Not Significant
Lens thickness	4.69	0.61	20	4.6	0.29	8	Not Significant

No difference between groups



Summary : PACS

- 22 % may progress to **closure**
- No disc or field changes; no blindness
- Laser PI may not be warranted for all occludable angles
 - Cataract surgery
- Special situations like repeated dilatation



Summary : Primary Angle Closure

- 28.5 % progress to angle closure glaucoma
- (Laser PI is effective in early cases)
- No blindness due to glaucoma



By Product : 5 year Progression to OHT

- 110 normals
- 25 of 29 OHT re-examined
 - Corrected IOP (for CCT)
- Progression to POAG : based on typical optic disc changes with corresponding field defects on automated perimetry

Progression OHT

- 2 reclassified as normal (CCT)
- Progression to POAG
 - 17.4%; 95 % CI: 1.95 - 32.75)
- RR of progression for OHT
 - 19.1 (95% CI: 2.2 – 163.4)
- All who progressed: bilateral OHT
- All who progressed
 - IOP fluctuation > 8 mm Hg (Day DVT)

V E S

- Population based information
 - Prevalence 1995
 - Progression 2000
- Lots & Lots of **Limitations**
- W --- I ----- D----- E CI's




