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CLINICAL STUDY

Lens thickness of Indian eyes: impact of isolated lens opacity, age, axial length, and influence on anterior chamber depth

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Abstract

Purpose **To report relationship of age group and axial length (AL) category to lens thickness values in eyes with a clear lens or different types of isolated cataract (nuclear, cortical, and posterior subcapsular (PSC)). Further, we evaluated lens thickness values on anterior chamber depth (ACD) in these eyes.**
Design **Observational clinic-based study.**
Methods **An observational study of 1442 eyes of 1442 individuals (816 eyes with isolated cataract and 626 eyes with clear lens) of those above 25 years of age was evaluated. AL and lens thickness were performed with an A-scan ultrasound after dilatation of the pupil, and manual optical pachymetry was used to measure ACD after dilatation of the pupil. Main outcome measures: Lens thickness.**
Results **Multiple regression analysis revealed that with each decade of advancement in age, the lens thickness increased by 0.155 mm ($P<0.001$). The difference in lens thickness after adjusting for age group and AL category was less in cortical cataract by −0.25 mm ($P<0.001$) and PSC by −0.29 mm ($P<0.001$); With advancement in AL category, lens thickness decreased by 0.004 mm ($P<0.001$). After adjusting for all the parameters/variables, regression analysis revealed that as lens thickness increased, there was a significant decrease in ACD (mean −0.44 mm; $P<0.001$).**
Conclusions **Lens thickness was significantly greater in clear lenses when compared with isolated cataracts—greatest with nuclear cataract and least with PSC. Age group and AL category had a significant impact on the lens thickness of both cataract and clear lens. A significant decrease in ACD was found with the increase in lens thickness.**
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Keywords: lens thickness; nuclear cataract; cortical cataract; posterior subcapsular; clear lens

Introduction

It is an accepted fact that the human lens becomes thicker as age advances, as lens fibres are continually added over time.[1] Adler[2] reported that the thickness of the normal human lens was 4 mm at the age of 20 years, 4.3 mm at the age 40 of years, 4.45 mm at the age of 50 years, 4.7 mm at the age of 60 years, and increased in thickness to beyond 4.7 mm after 60 years of age. A few authors have stated that after the globe length stabilizes in the second decade of life, there is a continuous increase in lens thickness of about 0.15–0.20 mm per decade.[3] The thickness of the human lens has been found to be related to age, sex, cataract type, and diabetic status.[4–9] The primary objective of our observational study was to compare lens thickness measurements in eyes with a clear lens to eyes with different types of isolated cataract (nuclear, cortical, and posterior subcapsular (PSC)); the influence of age groups and axial length (AL) categories on lens thickness; and the impact of lens thickness on anterior chamber depth (ACD) in individuals with cataract and clear lens.

Materials and methods

An observational study was undertaken at the Iladevi Cataract and IOL Research Centre, Ahmedabad, India, during the period September 2003 to April 2005. The study involved 1442 eyes of those more than 25 years of age with clear lens or isolated cataract. Informed consent was obtained from all the subjects. Healthy eyes with uncomplicated cataracts like nuclear cataract, cortical cataract, and PSC cataract, and clear lenses were included in the study. Only those patients without any kind of lens opacity were considered for the clear lens group. Patients who had even peripheral cortical spokes with a dilated pupil were not enroled in the clear lens group. Inclusion criteria were patients with bilateral morphologically similar cataracts and bilateral clear lens. We have randomly recruited only one eye of each patient with bilateral similar cataracts and clear lens. Subjects with mixed cataracts, posterior polar cataract, or who had been using systemic or topical steroids for various reasons for more than 3 months or those with a history of intraocular surgery, ocular trauma, raised intraocular pressure, uveitis, pseudoexfoliation, diabetes mellitus, total cataract, prophylactic laser photocoagulation, or cryotreatment were excluded. Subjects whose eyes could not attain 7-mm dilation were also excluded from the study. An exclusion criterion was patients with clear lens in one eye and pseudophakia in the contralateral eye and those with cataract in one eye and clear lens in the contralateral eye. After dilatation of the pupil with 1% tropicamide (Sunways Pvt Ltd, India) and 2.5% phenylephrine hydrochloride (Sunways Pvt Ltd) eye drops, a single observer examined the patient with a slit-lamp, and the presence or absence of lens opacity was documented. A single observer was used to avoid bias and to maintain reliability and consistency. The methodology adopted for evaluating lens status was standardized in terms of illumination and magnification for both groups. Clear lens assessment was carried out using oblique illumination. The nuclear cataract was observed under oblique illumination and a slit beam was fixed at 1 mm width and 14 mm height with $\times 12$ magnification, when the slit lamp was placed at an angle of 30–45 degrees. Retroillumination was used to assess cortical cataract and PSC. The illumination was kept at 100%. The cortical cataract and PSC appeared as darkly shaded interruptions of the reddish orange reflex. The observations were recorded using a video camera (Image archiving system, Carl Zeiss, Jena, Germany) attached to a slit lamp (Carl Zeiss, SL 120 Jena, Germany) keeping the illumination at 100%. A trained observer recorded the observations and measurements for each eye. Measurement of ocular dimensions, including AL and lens thickness, was obtained with an A-scan ultrasound 835 (Humphrey Instruments Inc., USA) using a velocity of 1640 m/s. Eyes were anaesthetized with a single drop of proparacaine HCl (0.5%; Sunways Pvt Ltd) two times at the interval of 2 min. Patients were placed in a sitting position and asked to look into a fixation light of probe and central 3 mm area was applanated. If the variation between the readings was greater than 0.2 mm, the examination was repeated again until five readings were recorded with <0.2 mm between each. An average value was obtained from these five readings. Manual optical pachymetry was used to measure ACD after dilatation of the pupil.

Both study populations were broadly grouped according to age (25–40, 41–50, 51–60, 61–70, and 70 + years), and the AL (<23.40 mm axial hypermetropic, 23.40–23.90 mm emmetropic, and >23.90 mm myopic). The method of statistical analysis was ANOVA using the Bonferroni test for *post hoc* analysis.

Results

The 1442 eyes studied (mean age: 52.48 ± 11 years) included 816 eyes with a cataract and 626 eyes with a clear lens. Irrespective of age and AL, the distribution of mean lens thickness per clear lens and different cataract types is depicted in Table 1a. ANOVA was performed with lens thickness as dependent variable and status of the lens (clear lens or cataract type) as the independent variables and found that lens thickness significantly differs between all the groups ($P<0.001$). Table 1b shows

Table 1a Descriptive statistics of lens thickness in eyes with and without cataract[a]

Cataract type	*Number of subjects*	*Mean thickness (mm ± SD)*	*95% confidence interval for mean (mm)*
Clear lens	626	4.38 ± 0.34	4.35–4.40
Nuclear	349	4.51 ± 0.59	4.45–4.57
Cortical	45	4.25 ± 0.48	4.10–4.39
PSC	422	4.07 ± 0.43	4.03–4.11
Total	1442	4.31 ± 0.47	4.29–4.34

ANOVA = analysis of variance; PSC = posterior subcapsular cataract.
[a]Lens thickness significantly differs between all the groups ($P<0.001$, ANOVA).

Table 1b Multiple comparisons using Bonferroni test for *post hoc* analysis of lens thickness between clear lens and different cataract types

Cataract type	*Clear lens*	*Nuclear*	*Cortical*	*PSC*
Clear lens		**<0.001**	0.063	**<0.001**
Nuclear	**<0.001**		**<0.001**	**<0.001**
Cortical	0.063	**<0.001**		**0.009**
PSC	**<0.001**	**<0.001**	**0.009**	

PSC = posterior subcapsular cataract. Statistically significant values are indicated in bold.

Table 2a Distribution of lens thickness according to clear lens and three cataract types per age group

Age group: cataract type	*Number of subjects*	*Mean thickness (mm ± SD)*	*95% confidence interval for mean (mm)*
*25–40 years**			
Clear lens	140	3.99 ± 0.33	3.93–4.04
Nuclear	5	4.01 ± 0.44	3.46–4.56
Cortical	3	3.24 ± 0.17	2.83–3.65
PSC	84	3.82 ± 0.37	3.74–3.90
Total	232	3.92 ± 0.36	3.87–3.96
*41–50 years**			
Clear lens	176	4.53 ± 0.20	4.50–4.56
Nuclear	47	4.27 ± 0.37	4.17–4.38
Cortical	5	4.07 ± 0.20	3.82–4.32
PSC	167	4.00 ± 0.39	3.94–4.06
Total	395	4.27 ± 0.40	4.23–4.31
*51–60 years**			
Clear lens	242	4.45 ± 0.30	4.41–4.49
Nuclear	120	4.49 ± 0.51	4.40–4.59
Cortical	19	4.32 ± 0.51	4.07–4.56
PSC	121	4.23 ± 0.45	4.15–4.31
Total	502	4.40 ± 0.41	4.36–4.44
*61–70 years***			
Clear lens	46	4.51 ± 0.09	4.48–4.54
Nuclear	130	4.66 ± 0.57	4.47–4.67
Cortical	18	4.39 ± 0.31	4.24–4.54
PSC	50	4.30 ± 0.36	4.20–4.41
Total	244	4.49 ± 0.47	4.43–4.55
*71+ years****			
Clear lens	22	4.55 ± 0.05	4.53–4.57
Nuclear	47	4.68 ± 0.89	4.42–4.94
Total	69	4.64 ± 0.73	4.46–4.82

PSC = posterior subcapsular cataract.
Significance of the difference in mean lens thickness between clear lenses and the three types of isolated cataract per indicated age group: *$P<0.001$; **$P=0.006$; ***$P=0.497$; SD.

Table 2b Multiple comparisons of lens thickness according to clear lens and different cataract types in different age groups

Age group: cataract type	*Clear lens*	*Nuclear*	*Cortical*	*PSC*
25–40 years				
Clear lens		0.881	**<0.001**	**0.001**
Nuclear	0.881		**0.003**	0.240
Cortical	**<0.001**	**0.003**		**0.005**
PSC	**0.001**	0.240	**0.005**	
41–50 years				
Clear lens		**<0.001**	**0.001**	**<0.001**
Nuclear	**<0.001**		0.167	**<0.001**
Cortical	**0.001**	0.167		0.639
PSC	**<0.001**	**<0.001**	0.639	
51–60 years				
Clear lens		0.319	0.179	**<0.001**
Nuclear	0.319		0.081	**<0.001**
Cortical	0.179	0.081		0.355
PSC	**<0.001**	**<0.001**	0.355	
61–70 years				
Clear lens		0.491	0.352	**0.028**
Nuclear	0.491		0.135	**<0.001**
Cortical	0.352	0.135		0.485
PCS	**0.028**	**0.001**	0.485	

PSC = posterior subcapsular cataract. Statistically significant values are indicated in bold.

the *post hoc* analysis results for the mean difference in lens thickness between all the groups.

The prevalence of the mean difference in lens thickness between clear lenses and the three types of isolated cataract per age group is depicted in Table 2a. Table 2b reports multiple comparisons of lens thickness values according to different age groups between different types of isolated cataract and clear lens.

The distribution of mean lens thickness between eyes with clear lenses and eyes with the three cataract types per AL category is depicted in Table 3a. Table 3b reports the *post hoc* analysis for multiple comparisons of these results.

The distribution of mean lens thickness of clear lens, nuclear, cortical, and PSC cataract types per age group is shown in Tables 4a–d. Pearson's correlation documented an increase in lens thickness with advancing age ($r=+0.45$, $P<0.001$); a decrease in lens thickness with an increase in ACD ($r=-0.48$, $P<0.001$); and a decrease in lens thickness with an increase in AL ($r=-0.01$, $P<0.001$).

Multiple regression with lens thickness as the dependent variable, and age group, AL category, and dummies for nuclear, cortical, and PSC as compared with clear lenses as independent variables showed that with each decade of advancement in age, the lens thickness increased by 0.155 mm ($P<0.001$). Also, the difference in lens thickness after adjusting for age group and AL category was less in the cortical cataract type by -0.25 ($P<0.001$) compared with clear lenses, and in PSC by -0.29 ($P<0.001$) compared with clear lenses. No significant difference was observed in lens thickness between nuclear cataract type and clear lenses (-0.0015 mm, $P=0.61$). Also, with advancement in AL category, the lens thickness significantly decreased by 0.004 mm ($P<0.001$).

Multiple regression analysis was performed after the age group was recategorized as up to 50 years and 50 years and above, revealing that with patients less than 50 years (after adjusting for other parameters), there was no significant difference in lens thickness between nuclear cataract type and clear lenses ($P=0.815$). However, above 50 years, as age advanced, the lens thickness of the nuclear cataract type increased by $+0.89$ mm more

Table 3a Clear lens thickness and three cataract types with different axial length category

Refractive error: cataract type	*Number of subjects*	*Mean thickness (mm ± SD)*	*95% confidence interval for mean (mm)*
Hypermetropic			
Clear lens	373	4.38 ± 0.39	4.34–4.42
Nuclear	137	4.58 ± 0.73	4.46–4.71
Cortical	27	4.24 ± 0.40	4.09–4.40
PSC	217	4.12 ± 0.43	4.06–4.17
Total	754	4.34 ± 0.51	4.30–4.37
Emmetropic			
Clear lens	100	4.32 ± 0.27	4.26–4.37
Nuclear	59	4.51 ± 0.47	4.39–4.63
Cortical	10	4.32 ± 0.69	3.83–4.81
PSC	73	4.08 ± 0.36	4.00–4.17
Total	242	4.29 ± 0.41	4.24–4.34
Myopic			
Clear lens	153	4.41 ± 0.22	4.37–4.44
Nuclear	153	4.44 ± 0.49	4.36–4.52
Cortical	8	4.17 ± 0.48	3.77–4.58
PSC	132	3.97 ± 0.46	3.90–4.05
Total	446	4.29 ± 0.45	4.24–4.33

PSC = posterior subcapsular cataract.

Table 3b Multiple comparisons of lens thickness according to clear lens and three cataract types with different axial length category

Refractive error: cataract type	*Clear lens*	*Nuclear*	*Cortical*	*PSC*
Hypermetropic				
Clear lens		**<0.001**	0.153	**<0.001**
Nuclear	**<0.001**		**0.001**	**<0.001**
Cortical	**0.153**	**0.001**		0.198
PSC	**<0.001**	**<0.001**	0.198	
Emmetropic				
Clear lens		**0.002**	0.950	**<0.001**
Nuclear	**0.002**		0.148	**<0.001**
Cortical	0.950	0.148		0.061
PSC	**<0.001**	**<0.001**	0.061	
Myopic				
Clear lens		0.431	0.114	**<0.001**
Nuclear	0.431		0.067	**<0.001**
Cortical	0.114	0.067		0.181
PSC	**<0.001**	**<0.001**	0.181	

PSC = posterior subcapsular cataract. Statistically significant values are indicated in bold.

than clear lenses ($P = 0.016$). After adjusting for all the parameters and variables, regression analysis revealed that with an increase in lens thickness, there was a significant decrease in ACD by −0.44 mm ($P < 0.001$).

Table 4a Distribution of clear lens thickness in different age groups[a]

Age group (years)	*Number of subjects*	*Mean thickness (mm ± SD)*	*95% confidence interval for mean (mm)*
25–40	140	3.99 ± 0.33	3.93–4.04
41–50	176	4.53 ± 0.20	4.50–4.56
51–60	242	4.45 ± 0.30	4.41–4.49
61–70	46	4.51 ± 0.09	4.48–4.54
71 +	22	4.55 ± 0.05	4.53–4.57
Total	626	4.38 ± 0.34	4.35–4.40

AVOVA = analysis of variance.
[a]Significance of the difference in mean clear lens thickness between indicated age groups ($P < 0.001$ (ANOVA)).

Table 4b Distribution of nuclear cataract lens thickness in different age groups[a]

Age group (years)	*Number of subjects*	*Mean thickness (mm ± SD)*	*95% confidence interval for mean (mm)*
25–40	5	4.01 ± 0.44	3.46–4.56
41–50	47	4.27 ± 0.37	4.17–4.38
51–60	120	4.49 ± 0.51	4.40–4.59
61–70	130	4.57 ± 0.57	4.47–4.67
71 +	47	4.68 ± 0.89	4.42–4.94
Total	349	4.51 ± 0.59	4.45–4.57

[a]Significance of the difference in mean cataractous lens thickness between indicated age groups ($P = 0.003$).

Table 4c Distribution of cortical cataract lens thickness in different age groups[a]

Age group (years)	*Number of subjects*	*Mean thickness (mm ± SD)*	*95% confidence interval for mean (mm)*
25–40	3	3.24 ± 0.17	2.83–3.65
41–50	5	4.07 ± 0.20	3.82–4.32
51–60	19	4.32 ± 0.51	4.07–4.56
61–70	18	4.39 ± 0.31	4.24–4.54
Total	45	4.25 ± 0.48	4.10–4.39

[a]Significance of the difference in mean cataractous lens thickness between indicated age groups ($P < 0.001$).

Table 4d Distribution of posterior subcapsular cataract lens thickness in different age groups[a]

Age group (years)	*Number of subjects*	*Mean thickness (mm ± SD)*	*95% confidence interval for mean (mm)*
25–40	84	3.82 ± 0.37	3.74–3.90
41–50	167	4.00 ± 0.39	3.94–4.06
51–60	121	4.23 ± 0.45	4.15–4.31
61–70	50	4.30 ± 0.36	4.20–4.41
Total	422	4.07 ± 0.43	4.03–4.11

[a]Significance of the difference in mean cataractous lens thickness between indicated age groups ($P < 0.001$).

Discussion

The human crystalline lens, which accounts for almost 20% of the eye's refractive power, increases in weight and volume throughout life through the production of new protein fibres.[10–13] Koretz *et al*[14] reported a positive relationship between age and lens thickness in the rhesus monkey, and other publications reported such a relationship in human adults. In the Beaver Dam Eye Study data, age was the most important descriptor of lens thickness.[6] In another study, a decrease was observed in lens thickness, especially in eyes with subcapsular and cortical opacities.[15] In one report, it was noted that the lens became thicker as the AL became shorter.[1] This observational report prompted us to ask whether any relationship exists between lens thickness values in eyes with different types of isolated cataract and those with clear lens, and the impact of age and AL on lens thickness values; and whether subjects with isolated cataract show any difference in lens thickness compared with the subject with clear lenses. We also wanted to examine the influence of lens thickness on the ACD. All the patients recruited for our study had isolated cataract types to facilitate our understanding of the disease process better. Diabetics are known to have thicker lenses.[6–8,16] Therefore, to remove the confounding effect of diabetes on lens thickness, diabetics were excluded. Peripheral cortical spokes can be missed in the non-dilated pupil. Hence, any eye with a pupil size <7 mm was excluded. Cycloplegia is essential for ultrasonic measurement of crystalline lens thickness, otherwise at an accommodated stage, the lens thickness will be overestimated.[17] All eyes were, therefore, put under cycloplegia with 1% tropicamide eye drops. Although 1% tropicamide is said to be a poorer cycloplegic agent than 1% cyclopentolate eye drops, the degree of difference would be small.[17] In a report on the biometry of 1000 cataractous eyes, and using the immersion technique A scan, the mean lens thickness was 4.63 ± 0.46 mm, when using 1641 ms sound velocity.[1] Our results show that the mean lens thickness of our isolated cataractous lenses was 4.26 ± 0.55 mm, whereas the clear lens was 4.38 ± 0.34 mm. It appears that cataractous and also clear lenses thicken with age and that this correlation was statistically significant (Pearson correlation $+0.45$ mm, two-tailed $P<0.001$). From age 70 years onwards, the changes caused by a cataract or clear lens had no effect on the change in thickness of the lens. In the Beaver Dam Eye Study, the lens thickness is strongly related to age.[6] Similar observations were observed in this study with a significant positive trend in lens thickness in all three types of cataract after adjusting for age. Similar to other published literature,[6,18] our data showed that those eyes with nuclear cataract had more lens thickness compared with cortical cataract and PSC. In our study, lens thickness was strongly related to nuclear cataract in all age groups. This finding was compatible with the findings reported by Kashima *et al*[5] and also the Beaver Dam Eye Study.[6,18] In the Beaver Dam Eye Study, they found a significant positive trend for nuclear cataract lens thickness and a negative trend for cortical cataract, and no consistent relationship with PSC.[18] However, in this study, except in the 41–50 age group, there was no significant difference found in lens thickness between nuclear cataract and clear lens in the *post hoc* analysis. In another study, it was found that those lenses developing nuclear cataract was thicker when compared with those not developing the relevant cataract type.[15] Increasing lens thickness with age would be anticipated because of the continuing production of lens cortex. The explanation of a direct relationship of this to nuclear cataract is unclear. Lens thickness and nuclear cataract are associated by virtue of being positively correlated with the passage of time, but they may also reflect different biologic mechanisms. Some authors speculate that lens thickness may be more closely related to chronologic age and nuclear cataract to biologic age.[18]

In this study, there was a significant difference in lens thickness between clear lens, and cortical cataract and PSC. In Beaver Dam Eye Study, lens thickness was less when compared to clear lenses.[18] In another study, similar observations were made on the mean thickness of the lens in patients with cortical cataract or PSC, where it was found to be significantly less than that in age-matched controls.[15] Mariani and Mangili[19] and Mariani and Pescatori[20] found that lenses with cortical cataracts had a lower weight than normal lenses.[20] Goldman and Favre found decreased lens thickness with cortical cataract compared with clear lenses.[21] It has been suggested that the inverse relationship between lens thickness and cortical cataract could be due to diminution in the production of normal cortical fibres, causing a decreased thickness in cortical cataract.

In another study on senile cataract, it was found that the thickness of the lens was less than in those with clear lenses in the same age group.[15] The study speculated that this was because of deficient fibre formation and protein synthesis in those with senile cataracts. In another report, the authors have concluded that cataractous lenses are definitely thinner than clear lenses.[22] The difference in lens thickness between clear lenses and PSC is significantly more; but the difference in lens thickness between clear lenses and nuclear cataract is minor. Nordmann and Eisenkopf[22] go on to suggest that the decrease in lens thickness is not only because of cessation of lens fibre growth, but also because of a leaking of lens material through the lens membranes.

This study confirmed the finding that there is a thinning of the lens in myopic subjects and a thickening of the lens in hypermetropic subjects. Another study documented similar observations in the cataractous population.[1] Yet another study found that lens thickness in PSC and cortical cataract was less in myopic subjects when compared with hypermetropic and emmetropic subjects.[23] The Beaver Dam and other non-population-based studies, it has been noted that the thinness of PSC can be explained by the fact that lenses with PSC are thinner to begin with, either because of a decreased rate of lens fibre formation or because of leakage of lens fibres.[24,25] As for PSC, the underlying biological explanation remains unknown for cortical cataract. In this study, after adjusting for all the parameters, it was found that the increase in lens thickness influenced a reduction in ACD. In one study, it was observed that as lens thickness increases, the ACD is reduced by about 40–50% of the lens growth (approximately 0.08–0.13 mm).[3]

Lens thickness is not a parameter that is used clinically in assessing the presence or absence of cataract. Cataractogenesis is multifactorial; the latency period of the time from the initiation of disease to the time of its first clinical symptom for cataract is poorly defined.[3] One possible clue to the latency period is lens thickness. The linear relationship between lens thickness and age makes it possible to compare the lens thickness of a given lens with the expected thickness for the age of the subject.[3] If there are major variations in the anterior segment as a result of injuries, inflammation, or previous keratoplasty, problems arise in predicting the original AL where former biometry is not available. Lens thickness along with vitreous body length helps in predicting AL in such eyes, when planning for PKP.[3]

An association between clinical appearance of the cataract and its hardness has long been suspected, as cataract surgeons recognizing that nuclear brunescence equates with hardness.[26] Knowledge of lens hardness helps the surgeon to anticipate the bulk of the lens substance and know the extent of the incision for extracapsular cataract extraction surgery. Lens hardness is also an important single factor in phacoemulsification, which is becoming an increasingly popular method for cataract surgery. This is further associated with an increased phaco time and phaco power, which make for a difficult operation overall, and is associated with increased morbidity.

According to the previous studies, lens thickness varies with different types of cataract.[17,20,24] The inverse relationship of lens thickness to cortical cataract suggests that although mechanisms for production of normal cortical fibres are causing increased lens thickness, a diminution in this productivity is associated with the development of cortical cataract. If we speculate this as a mechanism for reasoning, increased lens thickness would reflect 'health' of the lens and thinness would reflect 'disease'. Explanations of these observations require further laboratory and epidemiologic studies. Further studies also need to be evaluated on these patients for repeated measurements of their lenses and ACDs to see what in fact happens over the next 10 or 20 years.

A limitation of this study is that ACD was not measured before and after dilation as cycloplegia and lens movement may influence ACD and could be different in clear lenses, nuclear sclerosis, and cortical cataracts, as the amount of movement will vary.

In conclusion, after adjusting for all the parameters, the lens thickness was significantly greater in eyes with a clear lens when compared with three, isolated cataract types. In our cataractous eyes, lens thickness was most with nuclear cataract and least with PSC. Age was found to be strongly associated with lens thickness for all three cataract types and clear lenses. An increase in AL significantly influenced a reduction in the lens thickness between cataract type and clear lenses. A significant reduction in ACD was found to accompany an increase in lens thickness irrespective of cataract type or clear lens.

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