Libyan Med J. 2025;17(2):200-204
https://doi.org/10.69667/lmj.2517212
Libyan Medical Journal
https://lmj.ly/index.php/ojs/index *eISSN: 2079-1224*

Original article

Diabetes and Cataract Types in Libyan Patients: A Comparative Analysis

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Keywords:
Senile Cataract, Diabetic Retinopathy, Albayda, Libya.

A B S T R A C T

Senile Cataract is still one of the biggest causes of preventable blindness despite technological development in diagnosis and surgical procedures of cataract, and it is influenced by systemic diseases such as DM type 2. The present study aimed to assess the association of demographic characteristics & types of senile cataract among type 2 diabetic Libyan individuals & non-diabetics about diabetes status in Albayda, Libya. This cross-sectional, comparative, hospital-based study was carried out at the ophthalmology department, Albayda Medical Center, Al-Bayda city, Libya, from January 2024 to December 2024. 344 patients were scheduled for cataract surgery, full ocular examination done for all patients including (best corrected visual acuity (BCVA). Intraocular pressure (IOP), slit lamp examination& fundus examination). Data was analyzed using SPSS 20, and was presented as frequencies & percentages. The P-values < 0.05 were considered significant. Mixed cataracts were the most common type in both diabetic (79%) and non-diabetic (77.1%) patients; the association between cataract morphology and DR stages was not statistically significant. A significant gender difference was observed, with female predominance among diabetic cataract patients (63.3%, P < 0.05), while age distribution was similar across groups. This study demonstrated that diabetic patients, particularly women, represented a significant prevalence of mixed cataracts regardless of diabetic status. These results underscore the need for earlier eye screening in the Albayda population, particularly for diabetic females, and longitudinal studies to better identify diabetes-associated cataract progression.

Introduction

Cataract is a human lens opacity that usually causes blurred vision. It is the most frequent cause of blindness and visual disabilities, and is often associated with ageing. Cataract is responsible for more than 51% of blindness in the Eastern Mediterranean Region [1]. With aging, cataract prevalence is increasing, especially over the age of sixty years [2]. Cataract types are cortical (CC), posterior subcapsular (PSC) & nuclear (NS), each type may present independently, or they co-occur with each other, more often [3].

Cataract is still one of the biggest causes of preventable blindness despite technological development in diagnosis and surgical procedures of cataract [4]. People in low-income countries are more likely to get cataracts due to restricted access to cataract surgery [5]. In the Middle Eastern and North African area, the estimated annual productivity loss resulting from moderate to severe visual impairment and blindness was $33.6 billion, or 0.35% of the gross economy [6].

Compared to non-diabetics, the diabetic patient develops cataracts at an earlier age than non-diabetics [7]. The number of patients diagnosed with diabetes is increasing constantly, as is the number of patients sent for cataract extraction. Cataract extraction in diabetic patients is associated with a higher risk of both intra- and postoperative challenges [3]

The total adult diabetic patients in Libya were 399,200 in 2021 [8]. Prediabetes is very prevalent in Al Bayda-Libya. This means that Al Bayda will face a high diabetes incidence soon, which will cause a big economic burden on healthcare.[9]

Cataracts, if associated with diabetes, represent an important health and economic burden, particularly among low-income nations that lack DM and cataract treatment facilities. Regarding all this, clinicians must diagnose sight-threatening conditions such as cataracts in patients with diabetes as early as attainable, as well as the related risk factors implicated in the disease progression, in order to obtain the best outcomes of eye health care in diabetic patients [10].

Most studies on this topic are carried out in Western or Asian countries; their results may not be directly applicable to the Libyan context due to genetic, environmental, and health care facilities disparities, and

Received: *01-03-2025* - ***Accepted***: *29-04-2025* - ***Published***: *10-05-2025*

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https://doi.org/10.69667/lmj.2517212
Libyan Medical Journal
https://lmj.ly/index.php/ojs/index *eISSN: 2079-1224*

also, as prediabetes is very prevalent in Albayda there is no any previous studies on this topic in Albayda population. This study aimed to asses the association of demographic characteristic & types of senile cataract among type 2 diabetic Libyan individuals & non-diabetic in relation to diabetes status in Albayda city –Libya.

Methods

This hospital-based comparative, cross-sectional study was carried out at the Ophthalmology Department, Albayda Medical Center, Al-Bayda city, Libya, from January 2024 to December 2024. 344 patients were scheduled for cataract surgery, full ocular examination done for all patients including (best corrected visual acuity (BCVA). Intraocular pressure (IOP), slit lamp examination& fundus examination), diabetic retinopathy was classified on stages: no diabetic retinopathy (NDRP), non-proliferative diabetic retinopathy (NPDRP), proliferative diabetic retinopathy (PDRP). Cataract was classified morphologically into cortical (CC), nuclear (NC), posterior sub-capsular (PSC), and mixed types. The term 'mixed cataract' refers to the coexistence of multiple types of lens opacities within the same eye or both eyes in this study. Those with a history of congenital & secondary complications were excluded.

Data was analyzed using SPSS 20. Data were presented as frequencies & percentages. P < 0.05 was considered significant. The study protocol was approved by the medical service administration.

Results

Of 344 patients who underwent full ophthalmic examination, 143 patients were diabetics and 201 patients were non-diabetics. They divided into five age groups (table 1): 50-59 (7.7%), 60-69 (33.6%), 70-79 (51.1%), 80-89 (7.7%), and 90-99 (0.0%) years old in diabetics and 50-59 (5.0%), 60-69 (27.4%), 70-79 (56.2%), 80-89 (10%), and 90-99 (1.5%) in non-diabetic patient; p-value (>0.05), which is not significant.

Table 1. Diabetic and non-diabetic patients' age groups

Age		DM			P value
		No	Yes	Total	
50-59	Count	10	11	21	P =0.277
	%	5.0%	7.7%	6.1%	
60-69	Count	55	48	103	
	%	27.4%	33.6%	29.9%	
70-79	Count	113	73	186	
	%	56.2%	51.0%	54.1%	
80-89	Count	20	11	31	
	%	10.0%	7.7%	9.0%	
90-99	Count	3	0	3	
	%	1.5%	0.0%	0.9%	

Male to female ratio 106:95 and 52:91 (table 2) in non-diabetic and diabetic, respectively; p-value (<0.05), which was significant.

Table 2: Gender distribution in diabetic and non-diabetic groups

Sex		DM		Total	P value
		No	Yes		
Female	Count	95	91	186	0.003
	%	47.3 %	63.6 %	54.1 %	
Male	Count	106	52	158	
	%	52.7 %	36.4 %	45.9 %	

Frequency of cataract increases with age in both groups & total: 21 (6.1%), 103 (29.9%), and 186 (54.1%) in the 50-59, 60-69, & 70-79 age groups, respectively (Table 1); those >80 years old show a decline in frequency of cataract. The prevalence of cataract in both groups was 41.5% and 58.4% in diabetic and non-diabetic, respectively. The mixed type was the most common type of cataract in both groups (77.9%), followed by cortical (9.9%), r (7.8%), and posterior subcapsular (4.4%).

Table 3 shows the relationship between the types of cataracts and DRP status. Mixed cataract was the commonest type of cataract in all groups, with increased prevalence of cataract with increasing DR stages:

Received*: 01-03-2025 -* ***Accepted****: 29-04-2025 -* ***Published****: 10-05-2025*

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76.3%, 80%, and 90% in no DRP, NPDR, and DRP, respectively. Although the association was not statistically significant (P > 0.05).

Table 3: Relationship of cataract type with diabetic retinopathy status

Type of cataract		Diabetic Retinopathy status				Total	P value
		NO DM	NO DRP	NPDRP	PDRP		
Cortical	Count	20	12	2	0	34	0.721
	%	10.0%	12.9%	6.7%	0.0%	9.9%	
Mixed	Count	155	71	24	18	268	
	%	77.1%	76.3%	80.0%	90.0%	77.9%	
Nuclear	Count	19	5	2	1	27	
	%	9.5%	5.4%	6.7%	5.0%	7.8%	
Posterior subscapular	Count	7	5	2	1	15	
	%	3.5%	5.4%	6.7%	5.0%	4.4%	

Discussion

Based on the available information, this is the first study in Albayda City that addresses the demographic characteristics & types of senile cataract between type 2 diabetic and non-diabetic Libyan patients in relation to diabetes status. This study presents an in-depth analysis of the association between diabetes and cataract patterns in Libyan patients, showing significant demographic variations and cataract type distributions. Our results demonstrate significant patterns in the association between type 2 diabetes mellitus and cataract formation, with potential consequences for clinical practice and patient care.

The current study shows that the majority of patients with age-related cataract in both groups had ages between 70–79 years (51 % in diabetics vs. 56.2% in non-diabetics). Although there was a slight increase prevalence of diabetic patients in the younger age group 60–69 years (33.6% vs. 27.4%), this difference was statistically insignificant (P > 0.05). This result assumes that while diabetes may speed up the onset of cataract formation, it does not significantly affect the overall age distribution in these individuals and also the frequency of cataract in diabetic and non-diabetic in this study increase with age (50-59yrs) 6.1%, (60-69yrs)29.9%, (70-79yrs)54.1%, then decrease in patient >80yrs. Two studies have concluded. Similar results noted that aging remains the strongest independent risk factor for senile cataract [11,12].

Some international studies have found that senile cataracts' prevalence occurs at an earlier age group in diabetic patients compared to non-diabetic patients [13-15]. This inconsistency may be due to the difference between our study design -method and those of these studies, as our study is hospital-based and targeted people who were scheduled for cataract surgery, and also possibly due to the advanced age of our study population (54.1% within the 70-79 years age group). Gender disparity was statistically significantly found (P = 0.003), with diabetic patients, females were being predominantly (63.8% vs. 47.3% in non-diabetics). This finding indicates that female gender may be a separate risk indicator for cataract formation in diabetic patients in the Albayda population.

Different findings were reported in Derna, Libya, where gender was not found to be significantly associated with cataract formation among diabetic patients [16]. Another study conducted in Benghazi reported significant of cataract formation among males [17], highlighting possible geographical variations in risk profiles, healthcare supply, or health-related habits across different cities in Libya. However, our finding is consistent with previous international studies showing that females' predilection for cataract formation than males among diabetics. [18, 19]. This study has shown that Mixed (77.9%) was more common overall, followed by cortical (9.9%), and nuclear (7.8%) Posterior subcapsular (4.4%), with no significant relation between cataract type and diabetic retinopathy severity level (P > 0.05).

There is a predominance of Mixed (79%), followed by cortical (9.6%), nuclear sclerosis (5.7%), and posterior subcapsular type (5.7%) in diabetic patients. The superiority of mixed (77.1%) was more common, followed by cortical (10%), nuclear (9.5%), and Posterior subcapsular (3.5%) in non-diabetic patients. This difference between the two groups was insignificant

The high prevalence of mixed cataract in both groups in this study may be due to a late presentation, advanced age of our study population or a delayed access to health care services which leading to more than one type of lens opacities developing, similar result has been reported in other populations with limited accessibility to surgical intervention [20].

There is a disparity between previous researches about the most frequent type of cataract that associated with diabetes mellitus (DM), some reported that nuclear cataract was the most frequent type that associated with DM [21], others found cortical the most frequent one [12,13], others reported the Posterior subscapular cataract [22].

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These disparities may be due to different study methodology approaches and sample sizes. Although our analysis of the relationship between specific cataract types and diabetic retinopathy stages revealed that the mixed cataract increased with increasing diabetic retinopathy staging (76.3% in no DRP to 90% in proliferative DR without significant differences ($p > 0.05$), the same finding has been reported in the Saudi population [11]. While the present study did not report a significant relation between specific cataract morphology and diabetic retinopathy stages, the frequency of patients with both non-proliferative (8.7%) and proliferative (5.8%) diabetic retinopathy suggests important clinical relevance of this association.

Limitations

This hospital-based, cross-sectional study might not accurately reflect the broader Albayda community and cannot demonstrate causality. Cataract types were clinically classified without use of slit lamp photography, which might result in observer bias. The wider operational term for mixed cataract and the lack of data on diabetes duration and glycemic control make comparability with other studies challenging. Future longitudinal research is advised.

Conclusion

This study found that while the age distribution of age-related cataract was similar between diabetic and non-diabetic patients in Albayda City, females were significantly more affected among diabetics. Mixed cataracts were the most frequent type across all groups, regardless of the diabetic retinopathy severity. These findings emphasize the need for early eye screening programs, particularly targeting diabetic females over the age of 60. Future longitudinal studies using imaging-based cataract grading, duration of diabetes, and glycemic control markers are advised to further demonstrate the association between diabetes severity and specific cataract morphology formation.

Conflict of interest. Nil

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Received*: 01-03-2025 -* ***Accepted****: 29-04-2025 -* ***Published****: 10-05-2025*

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https://doi.org/10.69667/lmj.2517212
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الملخص

لا يزال إعتام عدسة العين الشيخوخي أحد أكبر أسباب العمى الذي يمكن الوقاية منه على الرغم من التطور التكنولوجي في تشخيص وإجراءات جراحة إعتام عدسة العين، ويتأثر بأمراض جهازية مثل داء السكري من النوع 2. هدفت الدراسة الحالية إلى تقييم العلاقة بين الخصائص الديموغرافية وأنواع إعتام عدسة العين الشيخوخي بين الأفراد الليبيين المصابين بداء السكري من النوع 2 وغير المصابين بداء السكري حول حالة مرض السكري في البيضاء، ليبيا. أجريت هذه الدراسة المقطعية المقارنة القائمة على المستشفى في قسم طب العيون - المركز الطبي بالبيضاء، مدينة البيضاء، ليبيا، من يناير 2024 إلى ديسمبر 2024. تم تحديد 344 مريضًا لجراحة إعتام عدسة العين، وتم إجراء فحص كامل للعين لجميع المرضى بما في ذلك) أفضل حدة بصرية مصححة (BCVA).ضغط العين (IOP) وفحص المصباح الشقي وفحص قاع العين (تم تحليل البيانات باستخدام برنامج SPSS 20 ، وتم تقديمها كترددات ونسب مئوية. تم اعتبار القيم الاحتمالية < 0.05 ذات دلالة إحصائية. كان إعتام عدسة العين المختلط هو النوع الأكثر شيوعًا لدى مرضى السكري (79%) وغير السكري (77.1%). ولم يكن الارتباط بين شكل إعتام عدسة العين ومراحل اعتلال الشبكية السكري ذا دلالة إحصائية. ولوحظ فرق كبير بين الجنسين، حيث غلبت الإناث على مرضى إعتام عدسة العين السكري(63.3% ، قيمة(P < 0.05 ، بينما كان توزيع الأعمار متشابهًا بين المجموعات. أظهرت هذه الدراسة أن مرضى السكري، وخاصة النساء، يمثلون انتشارًا كبيرًا لإعتام عدسة العين المختلط بغض النظر عن حالتهم السكرية. وتؤكد هذه النتائج على ضرورة إجراء فحص مبكر للعين لدى سكان البيضاء وخاصةً لدى الإناث المصابات بالسكري، وإجراء دراسات طولية لتحديد تطور إعتام عدسة العين المرتبط بالسكري بشكل أفضل.

Received*: 01-03-2025 -* ***Accepted****: 29-04-2025 -* ***Published****: 10-05-2025*