

## ***Evaluation of the efficacy of cataract treatment in elderly, old and aged patients***

### **Ocena skuteczności leczenia zaćmy u pacjentów w wieku starszym, podeszłym i sędziwym**

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#### **Streszczenie**

**Wstęp.** Zaćma jest uważana przez Światową Organizację Zdrowia za główną przyczynę upośledzenia i ślepoty wśród ludzi na świecie. Zarówno w Polsce jak i na świecie wraz ze starzeniem się społeczeństwa rośnie liczba osób, u których zmniejsza się zdolność prawidłowego widzenia spowodowana w dużej mierze zmętnieniem naturalnej soczewki. **Celem pracy** była ocena efektów leczenia zaćmy u pacjentów w wieku starszym, podeszłym i sędziwym w materiale oddziału okulistycznego Szpitala Specjalistycznego im. Henryka Klimontowicza w Gorlicach. **Materiał i metody.** Analizie poddano 1077 pacjentów powyżej 60. roku życia, u których wykonano usunięcie zaćmy metodą fakoemulsyfikacji. **Wyniki.** Najczęstszym rodzajem zaćmy wśród badanych pacjentów była zaćma starcza jądrowa (60,91%). Zaćma występowała istotnie częściej u osób w wieku podeszłym (63,32%) niż u osób w pozostałych grupach wiekowych ( $p < 0,0001$ ). Po zabiegu ostrość wzroku poprawiła się – najczęściej pacjenci prezentowali visus 0,9 (20,71%) oraz visus 1,0 (14,58%). **Wnioski.** Operacja zaćmy powoduje znaczną poprawę ostrości wzroku u pacjentów. *Geriatrics 2018; 12: 11-18.*

*Słowa kluczowe: zaćma, populacja geriatryczna, ostrość wzroku*

#### **Abstract**

**Background.** Cataract is considered by the World Health Organization to be the major cause of visual impairment and blindness among people in the world. Both in Poland and all over the world the aging population is being accompanied by an increase in the number of people with a progressively worsening ability to see correctly, which is largely due to a clouding of the natural lens. **The aim of the study** was to evaluate the effects of cataract treatment in elderly, old and aged patients as based on the material from the Department of Ophthalmology of Henryk Klimontowicz Specialist Hospital in Gorlice. **Material and methods.** 1077 patients over 60 years of age were analyzed, who underwent cataract phacoemulsification surgery. **Results.** The most common type of cataract among the patients analysed was senile nuclear cataract (60.91%). Cataract was significantly more common in the group of the old (63.32%) than in the other age groups ( $p < 0.0001$ ). After the surgery, their visual acuity improved, with visus usually amounting to 0.9 (20.71%) and 1.0 (14.58%). **Conclusions.** Cataract surgery results in significant improvement in visual acuity in patients. *Geriatrics 2018; 12: 11-18.*

*Keywords: cataract, geriatric population, visual acuity*

## Introduction

The progress of civilization, prosperity, as well as raising the level of medical care all have an impact on the regular lengthening of the average life span. In the Polish society, the population of elderly people is still increasing, which will result in the aging of the population in the coming decades. Therefore, more and more elderly people will need eye care and treatment [1]. In developed countries, cataract is a common ophthalmological disorder among the elderly, which creates a serious problem, despite expanded access to treatment [2]. The consequence of diseases that cause impairment of visual function is reduction of self-dependence, difficulties associated with everyday activities and avoidance of social occasions. All this affects the growth of a sense of disease in such a person, social isolation, awkwardness, as well as results in a lower quality of life [3].

The World Health Organization regards cataract as the main cause of visual impairment and blindness among people in the world. Every year, together with the aging population, there is an increase in the number of people with a progressively worsening ability to see correctly, which is largely due to a clouding of the natural lens. In the United States more than 2.5 million cataract surgeries are performed each year whereas in Poland the number of such surgeries amounts to approximately 150 000 procedures per year. According to data from the National Health Fund, in Poland in 2014, a total of 220 849 cataract surgeries with simultaneous lens implantation were performed [4]. It is estimated that in 2020 as many as 40 million people worldwide will be suffering from reversible blindness, and the number of cataract surgeries will have increased three times (when compared to 2000). Studies have shown that vision deterioration and aging-related cataract can cause higher mortality risk in elderly patients [5,6].

The number of patients awaiting a surgery to remove the cloudy lens is still growing despite the fact that in recent years there has been a tremendous growth of surgical treatment of this disease. These are mainly the elderly [7]. The result of long waiting times of patients for a cataract surgery is a negative impact they have on the quality of their lives. It is essential that the public be influenced to realise that cataract is a medical condition that can be fully cured [8].

## The aim of the study

The aim of the study was to evaluate the effects of cataract treatment in elderly, old and aged patients as based on the material from the Department of Ophthalmology of Henryk Klimontowicz Specialist Hospital in Gorlice.

## Material and methods

1077 patients over 60 years of age were analyzed, who were hospitalized and scheduled for phacoemulsification cataract removal surgery in 2015. After obtaining written permission of the hospital director, a retrospective analysis was made of medical records of the patients. The data obtained were statistically analyzed. Verification of the differences between variables were made using the  $\chi^2$  test of independence, adopting the significance level at p-value <0.05. The analysis also used the  $\chi^2$  compatibility test in order to study the differences in the sizes of the groups. The McNemar test was used with a view to studying differences between the dependent groups. Calculations were made with the use of the IBM SPSS Statistics 20. The study was conducted according to ethical principles and good research practice compliant with the Helsinki Declaration.

## Results

### Characteristics of the study group

Women were the more numerous group under study (65.55%). Elderly people (65-75 years) accounted for 33.89%. The largest group consisted of old (i.e. 76-85 years of age) patients (63.32%). The aged (over 86 years of age) people accounted for 2.79% patients. Cataract was significantly more common in the old (63.32%) than in the other age groups (p <0.0001). The most common type of cataract was senile nuclear cataract (60.91%). Complicated cataract affected 32.59% of the patients. Drug-induced cataract (5.29%) or traumatic cataract (1.21%) were also present but to a lesser extent.

### Types of cataract against the age and sex

Senile nuclear cataract affected 58.6% of the elderly people, 61.4% of the old and 76.7% of the aged patients. Traumatic cataracts were found in 2.2% of the elderly people, in 0.7% of the old people, and in none of the aged patients. Complicated cataract was found in 32.3% of the elderly people, in 33.3% of the old and in 20.0% of the aged people. Drug-induced cataracts were found in 6.8% of the elderly people, in 4.5% of the old and in

3.3% of the aged ones. The results obtained indicate that the age of the patients did not significantly differentiate the type of cataract present ( $p > 0.05$ ).

Statistically, clouding of the lens significantly affected more women (65.55%) than men ( $p < 0.0001$ ). In the women's group senile nuclear cataract occurred in 59.2% cases. Among the men, the percentage was higher (64.2%). Traumatic cataract was found in 0.8% of the women and 1.9% of the men. Complicated cataract was slightly more common among the women (34.0%) than among the men (29.9%). Drug-induced cataract affected 5.9% of the women and 4.0% of the men. The sex of the patients did not significantly affect the type of cataract ( $p = 0.1092$ ).

#### Data pertaining to the surgery and its effects

The majority of the patients had local drop anesthesia applied (98.79%). In the other cases general anesthesia was administered (1.21%).

Before the surgeries were performed, there were 23.03% patients with a visus of 0.1. After the surgeries, the number dropped to 4.46%. The differences were statistically significant. The number of people with a visus of 0.2 considerably decreased (from 12.81% before surgery to 5.01% after surgery). A slight but significant change was noted with the number of patients with a visus of 0.4 (9.94% before surgery, after surgery 7.43%). There was a significant post-treatment increase in the number of patients with a visus within the 0.8-1.0 range. Before the surgery 2.97% of the patients had a visus of 0.8 whereas after the surgery the number was 10.21%. Before the surgery 3.06% of the patients had a visus of 0.9; and after the surgery their number rose to 20.71%. Before the surgery there were 0.46% of patients with a visus of 1.0. After the surgery, the percentage of patients with a visus of 1.0 increased significantly, reaching the value of 14.58%.

An analysis of our own research showed that after the surgery the number of people whose visual acuity corresponded the motions of the hand in front of their eyes had significantly decreased (from 7.15% before the surgery to 0.56% after the surgery). Hand motions from a distance of 30 cm before the surgery were observed by 0.19% of the patients and by 0.09% of the patients after the surgery. The differences were statistically insignificant. It was found, however, that after the surgery the number of patients whose visual acuity was associated with light sense had significantly decreased (from 1.58% to 0.19%).

Lack of light sense affected only one patient (i.e. 0.09%) after the surgery, and the finger-count test at a distance of 1.5 m concerned only 0.28% of the patients prior to the surgery. It was found that the number of patients who had counted fingers at a distance of 10 cm had significantly dropped (5.57% to 1.39%). Also, there was a considerable decrease in the number of patients who had counted fingers before the operation at a distance of 30 cm (1.02% to 0.09%). The finger-count test from a distance of 50 cm concerned only 0.19% of people prior to surgery (Table I).

#### Visual acuity before and after the surgery against the sex and age of the patients

The sex of the patients was not significantly associated with their visual acuity, both before and after the surgery. Only in the case of visual acuity associated with hand motions in front of their eyes were the differences statistically significant. It was the men (9.7%) who displayed such visual acuity more often than the women (5.8%) ( $p=0.0184$ ).

The age of the patients significantly differentiated visual acuity before the surgery. It was found that visual acuity with a visus of 0.1 was 26.8% of the elderly, 21.4% of the old and 13.3% of the aged patients. Statistically significant differences pertained to the old, among whom there were indeed significantly fewer patients with a visus of 0.1 when compared to the elderly. Visual acuity with a visus of 0.2 was found in 8.5% of the elderly people, in 15.1% of the old and in 13.3% of the aged ones. Statistically significant differences pertained to the elderly patients when compared to the old patients: the elderly patients had a visus of 0.2 almost twice as frequently as the old patients. Visual acuity before the surgery associated with the motions of the hand in front of their eyes depended on the age of the patients. Visual acuity at this level was less often displayed by the elderly (6.0%) or the old (7.2%) than by the aged (20.0%). Significant differences were found between the aged and the old, where the likelihood of visual acuity at this level was significantly more frequent. Visual acuity associated with light sense differed clearly because of the age of the patients. It was less frequently that visual acuity at this level was displayed by the elderly (1.6%) or the old (1.2%). It was more frequent with the aged (10.0%). The likelihood of visual acuity at this level among the aged patients was more than 6 times as high as in the old patients (Table II).

Table I. Visual acuity before and after a surgery

Visus	before		after		P
	N	%	N	%	
0.1	248	23.03%	48	4.46%	<b>&lt; 0.0001</b>
0.2	138	12.81%	54	5.01%	<b>&lt; 0.0001</b>
0.3	102	9.47%	84	7.80%	0.1842
0.4	107	9.94%	80	7.43%	<b>0.0465</b>
0.5	109	10.12%	120	11.14%	0.4829
0.6	82	7.61%	107	9.94%	0.0693
0.7	49	4.55%	68	6.31%	0.0900
0.8	32	2.97%	110	10.21%	< 0.0001
0.9	33	3.06%	223	20.71%	<b>&lt; 0.0001</b>
1.0	5	0.46%	157	14.58%	<b>&lt; 0.0001</b>
hand motions in front of eyes	77	7.15%	6	0.56%	<b>&lt; 0.0001</b>
hand motions from a distance of light sense	2	0.19%	1	0.09%	1.0000
no light sense	17	1.58%	2	0.19%	<b>0.0003</b>
counts fingers from a distance of 1.5 m	0	0.00%	1	0.09%	-
counts fingers from a distance of 10 cm	3	0.28%	0	0.00%	-
counts fingers from a distance of 30 cm	60	5.57%	15	1.39%	<b>&lt; 0.0001</b>
counts fingers from a distance of 50 cm	11	1.02%	1	0.09%	<b>0.0020</b>
Total	2	0.19%	0	0.00%	-
Total	1077	100%	1077	100%	

Table II. Visual acuity before the cataract removal surgery and the age of the patients (reference group: "the elderly")

		Age			Total	OR (95% CI)		P	
		elderly	old	aged		old	aged		
Visus before	0.1	N	98	146	4	248	<b>0.74</b> <b>(0.55-1.00)</b>	0.42 (0.14-1.23)	0.0606
		%	26.8	21.4	13.3	23.0			
	0.2	N	31	103	4	138	<b>1.92</b> <b>(1.25-2.93)</b>	1.66 (0.54-5.06)	<b>0.0095</b>
		%	8.5	15.1	13.3	12.8			
	0.3	N	34	65	3	102	1.03 (0.66-1.59)	1.08 (0.31-3.75)	0.9886
		%	9.3	9.5	10.0	9.5			
	0.4	N	28	76	3	107	1.51 (0.96-2.38)	1.34 (0.38-4.68)	0.2015
		%	7.7	11.1	10.0	9.9			
	0.5	N	36	71	2	109	1.06 (0.70-1.62)	0.65 (0.15-2.85)	0.7854
		%	9.9	10.4	6.7	10.1			
	0.6	N	35	46	1	82	0.68 (0.43-1.08)	0.33 (0.04-2.46)	0.1705
		%	9.6	6.7	3.3	7.6			
	0.7	N	19	28	2	49	0.78 (0.43-1.42)	1.30 (0.29-5.87)	0.6124
		%	5.2	4.1	6.7	4.5			
	0.8	N	12	20	0	32	0.89 (0.43-1.84)	0.46 (0.03-8.02)	0.5919
		%	3.3	2.9	0.0	3.0			
	0.9	N	13	20	0	33	0.82 (0.40-1.66)	0.43 (0.02-7.38)	0.5241
		%	3.6	2.9	0.0	3.1			
	1.0	N	1	4	0	5	2.15 (0.24-19.28)	0.25 (0.01-6.29)	0.7238
		%	0.3	0.6	0.0	0.5			
hand motions in front of eyes	N	22	49	6	77	1.21 (0.72-2.03)	<b>3.90</b> <b>(1.44-10.52)</b>	<b>0.0169</b>	
	%	6.0	7.2	20.0	7.1				
hand motions from a distance of 30 cm	N	1	1	0	2	0.53 (0.03-8.57)	0.25 (0.01-6.29)	0.8757	
	%	0.3	0.1	0.0	0.2				
light sense	N	6	8	3	17	0.71 (0.24-2.06)	<b>6.65</b> <b>(1.58-28.06)</b>	<b>0.0007</b>	
	%	1.6	1.2	10.0	1.6				
counts fingers from a distance of 1.5 m	N	1	2	0	3	1.07 (0.10-11.85)	0.25 (0.01-6.29)	0.9563	
	%	0.3	0.3	0.0	0.3				

counts fingers from a distance of 10 cm	N	24	34	2	60	0.75 (0.43-1.28)	1.01 (0.23-4.52)	0.5453
	%	6.6	5.0	6.7	5.6			
counts fingers from a distance of 30 cm	N	4	7	0	11	0.94 (0.27-3.22)	0.76 (0.04-14.44)	0.8480
	%	1.1	1.0	0.0	1.0			
counts fingers from a distance of 50 cm	N	0	2	0	2	2.69 (0.13-56.09)	0.08 (0.00-4.28)	0.5598
	%	0.0	0.3	0.0	0.2			
Total	N	365	682	30	1077			
	%	100.0	100.0	100.0				
Significance level p	0.0371							

Table III. Visual acuity after the cataract removal surgery and the age of the patients (reference group: “the elderly”)

		Age			Total	OR (95% CI)		P
		elderly	old	aged		old	aged	
		N						
0.1	N	10	34	4	48	1.86 (0.91-3.81)	<b>5.46</b> <b>(1.60-18.61)</b>	<b>0.0141</b>
	%	2.7	5.0	13.3	4.5			
0.2	N	13	34	7	54	1.42 (0.74-2.73)	<b>8.24</b> <b>(3.00-22.65)</b>	<b>&lt; 0.0001</b>
	%	3.6	5.0	23.3	5.0			
0.3	N	27	54	3	84	1.08 (0.67-1.74)	1.39 (0.40-4.88)	0.8618
	%	7.4	7.9	10.0	7.8			
0.4	N	18	59	3	80	<b>1.83</b> <b>(1.06-3.14)</b>	2.14 (0.59-7.73)	0.0788
	%	4.9	8.7	10.0	7.4			
0.5	N	39	80	1	120	1.11 (0.74-1.67)	0.29 (0.04-2.17)	0.3391
	%	10.7	11.7	3.3	11.1			
0.6	N	24	78	5	107	<b>1.83</b> <b>(1.14-2.95)</b>	2.84 (1.00-8.08)	<b>0.0198</b>
	%	6.6	11.4	16.7	9.9			
0.7	N	22	45	1	68	1.10 (0.65-1.86)	0.54 (0.07-4.13)	0.7429
	%	6.0	6.6	3.3	6.3			
0.8	N	33	76	1	110	1.26 (0.82-1.94)	0.35 (0.05-2.63)	0.2542
	%	9.0	11.1	3.3	10.2			
0.9	N	91	129	3	223	<b>0.70</b> <b>(0.52-0.95)</b>	0.33 (0.10-1.13)	<b>0.0248</b>
	%	24.9	18.9	10.0	20.7			
1.0	N	82	74	1	157	<b>0.42</b> <b>(0.30-0.59)</b>	<b>0.12</b> <b>(0.02-0.89)</b>	<b>&lt; 0.0001</b>
	%	22.5	10.9	3.3	14.6			
hand motions in front of eyes	N	1	4	1	6	2.15 (0.24-19.28)	12.55 (0.77-205.89)	0.0948
	%	0.3	0.6	3.3	0.6			
hand motions from a distance of 30 cm	N	0	1	0	1	1.61 (0.07-39.60)	0.08 (0.00-4.28)	0.7484
	%	0.0	0.1	0.0	0.1			
light sense	N	0	2	0	2	2.69 (0.13-56.09)	0.08 (0.00-4.28)	0.5598
	%	0.0	0.3	0.0	0.2			
no light sense	N	1	0	0	1	0.25 (0.01-6.29)	0.25 (0.01-6.29)	0.3767
	%	0.3	0.0	0.0	0.1			
counts fingers from a distance of 10 cm	N	4	11	0	15	1.48 (0.47-4.68)	0.76 (0.04-14.44)	0.6381
	%	1.1	1.6	0.0	1.4			
counts fingers from a distance of 10 cm	N	0	1	0	1	1.61 (0.07-39.60)	0.08 (0.00-4.28)	0.7484
	%	0.0	0.1	0.0	0.1			
Total	N	365	682	30	1077			
	%	100.0	100.0	100.0				
Significance level p	<b>&lt; 0.0001</b>							

The age of the patients had significant influence on their visual acuity after the surgery to remove the clouded lens. Visual acuity of a visus of 0.1 and 0.2 was more frequently displayed by the aged patients as compared to the elderly people. Age slightly differentiated visual acuity of a visus of 0.4 and 0.6 - such visual acuity was significantly more often displayed by the old patients when compared to the elderly. It was found that after the surgery a visus of 0.9 occurred significantly less frequently in the old patients than in the elderly ones. Statistically significant differences were also demonstrated between visual acuity of a visus of 1.0 and the patients' age - the old and aged patients had significantly lower visual acuity of a visus of 1.0 when compared to the aged patients. The age of the patients was not found to significantly differentiate other values of visual acuity after the surgery (Table III).

## Discussion

Untreated eye diseases are the leading cause of visual impairment. According to the World Health Organization, approximately 258 million people worldwide suffer from diseases related to the organ of sight, out of whom 86% are people with visual impairments, and 14% are the blind. The problem of the deterioration of the eye most often affects the population over 50 years of age [9]. Impairment of this organ has a significant impact on a person's everyday life activities as well as on reducing their social activity.

Our findings indicate that the problem of lens opacity in the geriatric population in the Gorlice hospital concerned 1077 patients, including 65.55% women and 34.45% men. "The Polish women 50 plus" report confirms that cataract is more common in women (70%) than in men (30%) [10]. Partyka and Wysocki also note the predominance of females admitted to hospital with cataract (70%) over the males (30%). According to the authors, women over the age of 65 account for the vast majority of patients who undergo hospitalization as a result of eye diseases [9].

The largest group of patients under analysis were old patients - 63.32% (between 76 and 85 years of age), whereas the least numerous group were aged patients (over 86 years of age) - 2.79%. The research conducted by Topczewska-Cabanek et al. shows that the predominant group of cataract patients are old patients (43% of the patients studied), and the group of elderly patients is half as numerous (22.88%) [2]. The results shown in the "Polish women 50 plus" report confirm that the

clouding of the lens accounts for 50% of the old, as well as 20% of aged people, and a clear upward trend of this disease can still be observed [10].

The analysis of the data from the Gorlice hospital leads to the conclusion that the most common type of cataract among the patients studied is senile nuclear cataract (60.91%). The research confirms that the most common form of the lens clouding is senile cataract, which affects people over 65 years of age. It is mainly due to free radical degeneration and metabolic processes in patients [11]. Similarly, based on their own research Kalinowski and Bojakowska state that the clouding of the lens mainly affects elderly people. Also, mention should be made of the comparative results of the research conducted at the Provincial Hospital of Ophthalmology in Krakow in 1995 and 2005, which show that in those years there was a 6-fold increase in the number of patients above 80 years of age who required hospitalization and ophthalmic treatment. It was cataract that was the main reason for the patients' sojourn in the hospital [12].

Our findings show that local anesthetic drip was used with the majority of the patients (98.79%) before the clouded lens removal surgery. According to source literature, general anesthesia is usually not necessary during a cloudy lens removal from the eye of the patient. Cataract surgery is generally performed in old patients, and general anesthesia increases the risk of side effects in the form of metabolic, respiratory and circulatory disorders as well as nausea, or vomiting. Accordingly, cataract removal surgeries are most typically performed using the surface spinal (local drip) anaesthesia [13]. According to Mielech, cataract surgery under general anesthesia is usually required in young patients owing to a high degree of anxiety on their part and greater motion sensitivity [14]. On the other hand, Marciniak et al. are of the opinion that a patient properly prepared for a clouded lens removal surgery should not feel any anxiety, but should be indifferent to stimuli as well as remain in a motionless position [15].

Our own research showed there to be a correlation between the removal of the clouded lens and the improvement of visual acuity in the patients. The patients with visual acuity (visus of 0.1) before the surgery accounted for about 23% of those under study, whereas after the cataract surgery their number decreased to 4.46%. It is worth a mention that there was a significant decrease in the number of patients with a visus of 0.2 (from 12.81% before the surgery to 5.01% after surgery).

The issue of vision improvement after a clouded lens removal surgery was taken up in the study by Kubik et al. According to their analysis, the vast majority of the patients (98%) declare improvement of their visual acuity after a surgical removal of the clouded lens. More than half of the patients (58%) describe the improvement in vision as large, 20% of the patients regard their vision improvement as very large - they can see perfectly [16]. Similar test results were received by Kalinowski and Bojakowska. The analysis of the data obtained from patients of The Private Eye Clinic in Lublin shows that 57% of the patients consider the outcome of the surgical removal of the clouded lens to be very good, 35% see it as good, whereas only 8% of the patients describe it as unsatisfactory [12]. In a study conducted by Alio et al., the majority of patients (60%) assess visual acuity as good during a medical check-up in the early postoperative period. The patients were operated using phacoemulsification [17]. According to Michalski, distance visual acuity equals 0.5 in the majority of patients who underwent cataract surgery using phacoemulsification (during a check-up the next day after the surgery), while during subsequent checkups the visus is equal to 0.8 - 0.9 [18].

Taking into account the results of our own research as well as source literature data, it is to be concluded that cataract surgery results in a significant improvement in patients' visual acuity. In addition, such

improvement is connected with a greater satisfaction with the quality of life of the patients operated on, with self-reliance opportunities in everyday life, as well as increased activity in the social environment.

## Conclusions

1. Clouding of the lens is most common in old patients.
2. Cataract is much more common in women than in men.
3. Among the populations of men and women under examination senile nuclear cataract is most common.
4. The clouded lens removal surgery significantly improves visual acuity among the patients who have had the surgery.

## Konflikt interesów / Conflict of interest

Brak/None

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