



Research Paper

## The assessment of the physical ability of elderly patients before and after knee arthroplasty

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### Abstract

*The assessment of the physical ability of elderly patients before and after knee arthroplasty.*

*Introduction: Osteoarthritis of the knee is one of the most common diseases among Middle-aged and elderly people. Knee arthroplasty is the preferred treatment in terms of patients suffering from advanced degenerative changes in the knee. The aim of the study is to assess the physical ability of patients before and after knee replacement surgery.*

*Material and Methods: The study group consisted of 200 people over the age of 60. All patients were examined twice- before surgery and 3 months after knee arthroplasty. Standardized questionnaires such as the ADL, IADL, Barthel and socio-demographic data were used in the study.*

*Results: More than half of respondents-58% were women, while men accounted for 42% of the study group. The largest group consisted of individuals aged from 60 to 74 years - 54.0%, and also individuals who had worked physically - 46.0%. The vast majority of respondents lived with family / carer - 66.0%. In all scales evaluating physical ability among respondents statistically significant differences were noted, ie. Physical ability was assessed at a better level in terms of independence after the knee replacement surgery.*

### Conclusion

1. *There was a significant statistical relationship between physical ability of patients before and after knee replacement surgery. According to the Barthel scale the physical ability of individuals after treatment improved, respondents became more self-reliant*

2. *Statistically significant differences were demonstrated, according to the IADL scale, in performing complex daily activities. After knee arthroplasty patients were more independent than before surgery.*

3. *Material conditions had a statistically significant impact on the performance of complex tasks in everyday life both before and after surgery. The better the financial situation of the patient, the better their physical ability.*

**Keywords:** *geriatrics, knee arthroplasty, gonarthrosis, physical ability*

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### I. INTRODUCTION:

The progressive aging of the population and the increase in physical activity among young people lead to an increased number of people with symptoms of joint damage, which if untreated can lead to premature degenerative changes. The knee joint, due to its structure and function, is especially frequently exposed to damage. Knee arthroplasty is the preferred treatment among the available methods of treating patients suffering from advanced degenerative changes in the knee [1, 2, 3].

Most often patients go to the doctor when the pain associated with the disease does not allow them to perform everyday activities as well as walking to work. Due to this disease patients are withdrawn from social and even partly from family life as longer walks become too strenuous and painful for them.

The treatment of degenerative changes aims to reduce pain, improve functioning in daily life and often enable the return to recreational physical activity and sport. Preparation for surgery, the operating procedure and postoperative rehabilitation all play an important role in the success of arthroplasty surgery [4,5, 6,7].

Rehabilitation is an important element in comprehensive medical treatment of patients who had to undergo arthroplasty surgery due to their underlying knee condition [1, 6, 9]. The aim of this treatment is to

restore mobility of the operated knee joint as far as possible and full muscle control over it, or to restore the normal static and dynamic function of the joint and the entire lower limb. The success of the rehabilitation depends on the cooperation of the whole medical team taking part in it, mainly including the surgeon, physiotherapist, nurses, and most importantly the patient [1, 10].

The aim of the study is to assess the physical ability of patients before and after knee replacement surgery.

**Material and Methods:** The study group consisted of 200 people over the age of 60. All patients were examined twice - before surgery and 3 months after undergoing knee arthroplasty. The study was conducted in the Kujawsko-Pomorskie and Warmia-Mazury provinces, in branches of Orthopaedic Trauma Surgery and the Department of Orthopedics and Traumatology. The study used standardized questionnaires such as the ADL, IADL, Barthel and socio-demographic data. These scales are used to evaluate both simple and complex everyday activities. The study was approved by the Bioethics Committee at the Medical College of L. Rydygier in Bydgoszcz. The correlation between two variables was calculated using the Spearman correlation coefficient. The Mann-Whitney U nonparametric test was also used to evaluate the differences of one feature between two groups. To assess the significance of the correlation coefficient the level of significance  $p \leq 0.05$  was considered statistically significant.

**Results:** More than half of respondents-68% were women, while men accounted for 32% of the study group. The largest group consisted of individuals aged from 60 to 74 years - 54.0%, and also individuals who had worked physically - 46.0%. The vast majority of respondents lived with family/carer - 66.0%, the remaining 34% were individuals living alone. In all scales evaluating physical ability among respondents statistically significant differences were noted, ie. Physical ability was assessed at a better level in terms of independence after the knee replacement surgery. (Table I).

**Table I. Interpretation of the IADL results**

assessment	before surgery		after surgery	
	number	%	number	%
low level of efficiency	52	26,0	23	11,5
average level of efficiency	33	16,5	41	20,5
high level of efficiency	115	57,5	136	68,0
Total	200	100,0	200	100,0

Statistically significant differences  $p = 0.000$  were observed in assessing the study group before and after treatment using the Barthel scale. The ADL scale showed statistically significant differences  $p = 0.002$ . Statistically significant differences  $p = 0.000$  were observed in assessing the performance of complex activities using the IADL scale.

The material conditions of respondents had an impact on everyday functioning, both before and after surgery. Statistically significant differences between the IADL scale and material conditions of the respondents have been noted (Table II).

**Tabel II. The correlation of material conditions and the IADL results**

assessment	N- number of respondents	R- correlation coefficient	t(N-2) – t test results at the N-2 degrees of freedom	p- level of significance
before surgery	200	-0,499	-3,988	0,000
after surgery	200	-0,337	-2,477	0,017

## II. DISCUSSION:

This study showed that mostly women (68%) have undergone knee replacement surgery, this is also confirmed by other authors - Wojciechowski et al. where the percentage of women surveyed was 81.5% [11]. Degenerative changes of the knee are more common in women than men. It is believed that an increased proportion of post arthroplasty women, especially after menopause, may indicate the impact of hormonal

disorders on the emergence of such changes [12, 13]. The increased incidence of women with degenerative knees is considered to be one of the factors of endogenous development of the disease [14, 15].

This study showed that knee replacement surgery has a positive impact on the physical ability of patients. The analysis of the Barthel scale results shows that respondents had the greatest difficulty, before surgery, in moving around (from bed to chair and back / sitting), moving (on flat surfaces) and climbing up and down stairs. After surgery, physical ability in carrying out these activities increased considerably. These findings correlate with studies by Paradowski PT et al., and also Vogel LA et al. where it was proved that limiting the bend to an angle of 90 ° was recorded before surgery in 37 (92%) patients, and in 29 (72%) of the examined patients. The movement was carried out either painlessly or with slight pain. The biggest limitation of flexion on average (17.5°), was observed in patients over the age of 74 [16, 17].

Ensuring proper range of motion of the knee is important for preventing degeneration, regardless of the etiological substrate. In patients with gonarthrosis there are limitations to the degree of bending and joint contracture [12, 13, 18]. Widuchowski et al. emphasize that, for various reasons, there is not always an increase in the range of movement of the joint after surgery and that is why it is important to properly carry out rehabilitation after surgery to achieve the maximum improvement in mobility and above all avoid its limitation [19]. Research by Śmiłowicz confirms that exercise should be carried out so as to ensure that at the end of the first week the patient is able to fully straighten the knee, which is the fundamental criterion to start walking with the aid of crutches [20]. The influence of early rehabilitation on the efficiency of patients after surgery is also confirmed by Vogel LA et al. [17].

The study showed that before surgery, the largest number of patients, are those with a high degree of efficiency in complex everyday activities -57.5%, or those having an average degree of efficiency - 16.5%. After surgery, the vast majority of patients have a high degree of efficiency - up to 68.0%. The use of knee replacement shall not eliminate completely the difficulties in carrying out certain everyday activities, but will make them easier to perform by primarily reducing pain. This study also showed that the material conditions had a statistically significant impact on the performance of complex everyday tasks. A good financial situation allows patients who have undergone knee replacement surgery to prepare better for surgery and also plays an important role in the rehabilitation process. It is not known how this research correlates with studies of other authors, because no results have been found.

### III. CONCLUSION

1. There was a significant statistical relationship between physical ability of patients before and after knee replacement surgery. According to the Barthel scale the physical ability of individuals before surgery was average and improved considerably after surgery, respondents became more self-reliant
2. Statistically significant differences were demonstrated, according to the IADL scale, in performing complex daily activities. After knee arthroplasty patients were more independent than before surgery.
3. Material conditions had a statistically significant impact on the performance of complex tasks in everyday life both before and after surgery. The better the financial situation of the patient, the better their physical ability.

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