

Variation of the Oswestry Disability Index in Patients with Lumbar Vertebral Discopathy, Surgically Treated

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Abstract

The prospective study was performed to highlight the evolution of the Oswestry Disability Index (ODI), before and after surgical treatment of lumbar disc herniation. A group of 100 patients was used, hospitalized and treated surgically in the Neurosurgery Department of the Constanta County Hospital, between 01.08.2020-31.12.2021. The study took into account general patient data (age, sex, provenience), comorbidities (obesity, diabetes, hypertension, chronic treatment with antiplatelet agents before surgery) and the presence of aggravating factors of lumbar vertebral disc disease with indication surgery (presence of polydiscopathy, motor deficit, preoperative and postoperative disc recurrence). There was a significant improvement in the severity of the degree of disability of surgically treated patients, both at one month and at 3 months, postoperatively. The improvement of the degree of disability was different, given the presence of aggravating factors, preoperatively and also the occupational factor, which delayed the postoperative clinical evolution, both, by rapid reintegration into daily life with physical effort and by the production of recurrences of discal pathology.

Keywords: polidiscopathy; lumbar discopathy; discal herniation; Oswestry scale; disability index.

1. Introduction

The medical-social importance of lumbar vertebral disc disease is given by the frequency of this condition and the degree of disability that this condition can cause.

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After some necropsy investigations, it is stated that almost any individual after 40 years has at least one cervical and a lumbar disc protrusion, lesions that are not necessarily accompanied by clinical manifestations, 7% of the population have discopathy in clinical form and 25% in subclinical form [1]. The lumbar disc herniation correlated with the physical incapacity, of variable degree, which it determines, outlines the size of the impact on the economic level of this condition. The inability to exercise and the duration of medical leave granted to patients with lumbar disc herniation amount to thousands of hours of work, which has an impact on the state economy [1]. Equally important is the medical impact of lumbar vertebral disc disease. The symptomatic polymorphism of patients with lumbar disc herniation, depending on the evolutionary moment of the disease and the anatomopathological factors, make the carriers of this disease to reach a multitude of specialists in different medical fields [1]. To assess the degree of disability caused by lumbar disc herniation, Jeremy Fairbank and his colleagues Has been using, since 1980, in the journal *Physiotherapy*, the Oswestry Disability Index (or the Oswestry Lumbar Pain Disability Questionnaire), a tool. extremely important, which allows evaluators to measure permanent functional disability and which is now the gold standard for functional evaluation tools [2-4]. The Oswestry Disability Index (ODI) includes 10 questions, related to the intensity of pain, the ability to lift weights, the ability to take care of yourself, to sit down, to stand up,, sexual function, sleep quality and ability. to travel. Each topic category is followed by 6 statement describing different potential scenarios in the patient's life relating to the topic. The patient then checks then checks the statement which most closely resembles their situation. Each question is scored on a scale of 0-5 with the first statement being 0 and indicating the least amount of disability and the last statement is scored 5 indicating most severe disability. The scores for all questions answered are summed, then multiplied by two to obtain the index(range 0 to 100). An index from : 1%-9% no disability, 10%-29% indicates mild disability, 30%-49% moderate disability, 50%-69% indicate severe disability and 70%-100% indicates a patient completely disabled [2-5].

2. Material and Methods

A prospective study was performed on a group of 100 patients with lumbar vertebral discopathy with herniated disc, hospitalized and treated surgically in the Neurosurgery Clinic of the County Emergency Hospital, "St. Apostol Andrei "Constanta, between August 1, 2020 and December 31, 2020. For the realization of the study group, a series of criteria for inclusion / exclusion of enrolled patients were observed. The criteria were not restrictive in the sense that all hospitalized patients and operated with hdl were enrolled, excluding patients who did not comply or were known to have mental illness. Patients' written consent was obtained for enrollment. The recording and statistical processing of the study data was done using IBM SPSS statistics 20. In conducting the study, the evolution of the Oswestry Disability Index, preoperative, postoperative at one month and at 3 months, was taken into account, depending on the following parameters:

- patient gender (male / female)

- patient age (<40 years / 40-60 years /> 60 years)

- residence (urban / rural)

- the presence of polydiscopathy
- presence of motor deficit, preoperative
- presence of recurrence, preoperative
- body mass index
- comorbidities (Diabetes mellitus, hypertension, chronic antiplatelet therapy)

3. Results

From the study group, 44% of patients are male and 56% of patients are female, 22% of patients are under 40 years of age, 42% are between 40 and 60 years of age and 36% are age over 60 years. The average age of patients is 50.96 years and is in the range of 20-69 years. 46% of patients come from rural areas, 54% of patients come from urban areas.

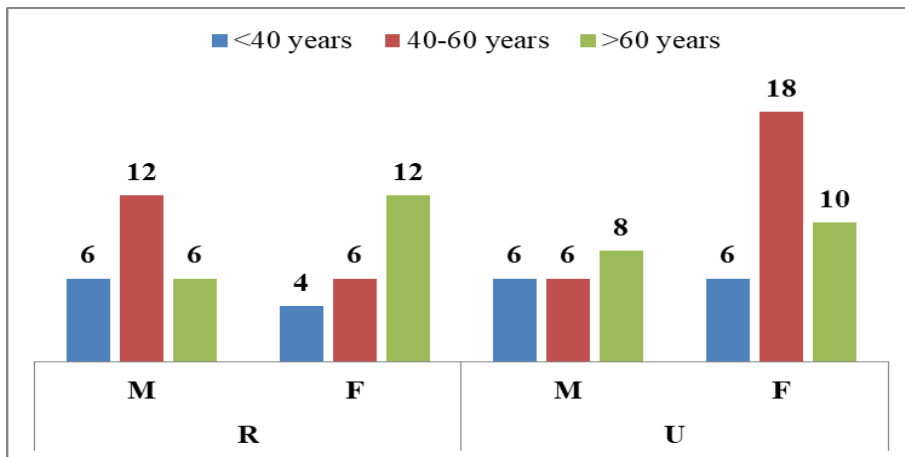


Figure 1: Distribution of patients according to age, sex and environment of origin

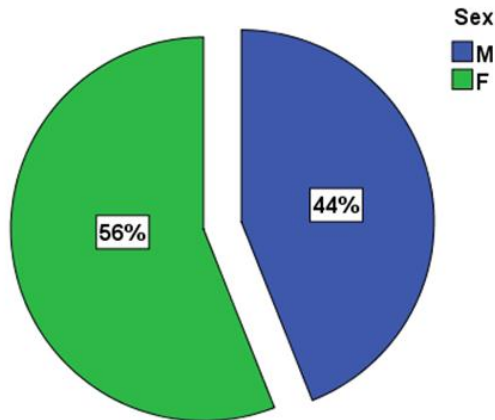


Figure 2: Distribution of patients by sex

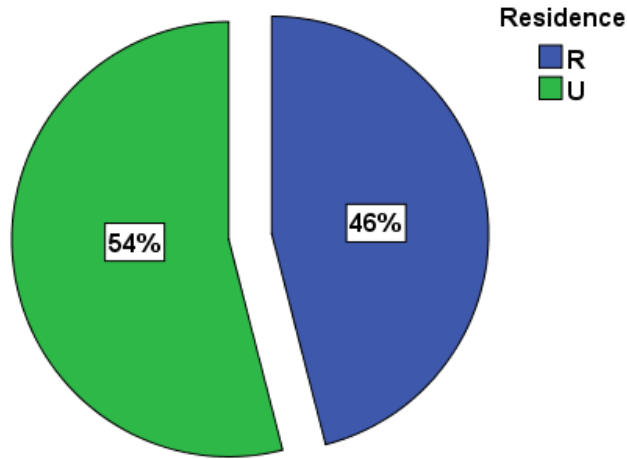


Figure 3: Distribution of patients according to residence

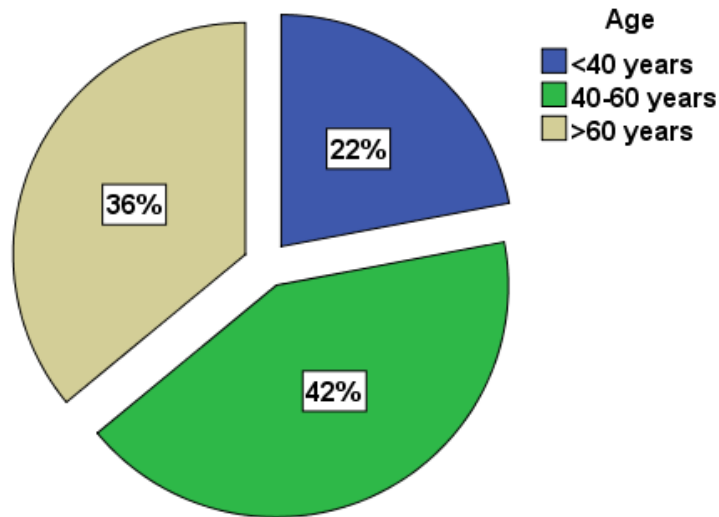


Figure 4: Distribution of patients by age groups

Most patients from rural areas are men aged 40 to 60 years (12/12%) and women over 60 years (12/12%), while in urban areas most of the patients (8/8%) are men over 60 years old and women (18/18%) aged between 40 and 60 years.

Based on the average, there is an evolution of the initial ODI indicator (50.28), at one month (16.22) and at three months (12.86). At the initial moment ODI registers values in the range 31-70, at one month ODI takes values between 8-25, while the lowest values are captured at 3 months, in the range 7-23.

Table 2: The evolution of ODI in the three moments based on the recorded averages

	ODI initial	ODI at one month	ODI at three months
Mean	50.2800	16.2200	12.8600
Median	50.0000	16.0000	13.0000
Std. Deviation	10.58690	3.45411	3.54486
Minimum	31.00	8.00	7.00
Maximum	70.00	25.00	23.00

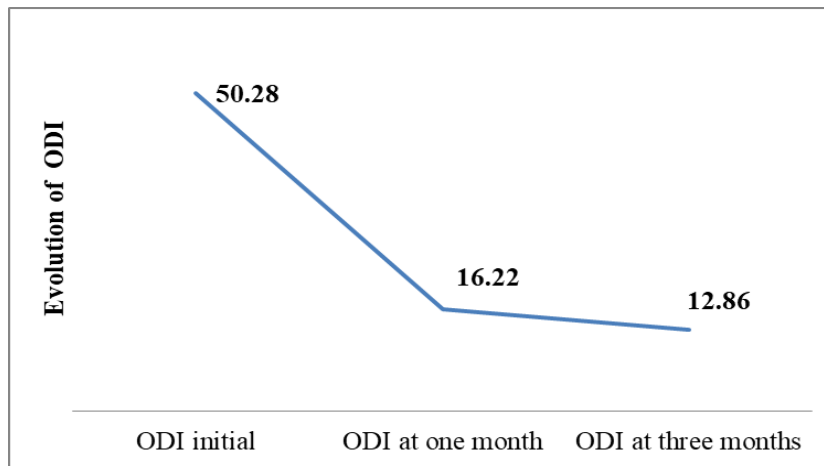


Figure 5: The general evolution of ODI from preoperative, to 3 months postoperative

Table 3: Evolution based on the average ODI indicator from preoperative to 3 months considering the sex of patients

		Mean	Std. Deviation	Minimum	Maximum
ODI initial	M	49.4545	11.45965	31	70
	F	50.9286	9.90474	33	69
ODI at one month	M	16.0909	3.13879	8	21
	F	16.3214	3.70801	11	25
ODI at three months	M	12.6364	3.16295	7	18
	F	13.0357	3.83744	7	23

In both, women (50.92) and men (49.45), the average ODI scores obtained in the preoperative period improve significantly at one month (16.32 / 16.09) and keep the same positive evolution in the case of evaluation at three months (13.03 / 12.63).

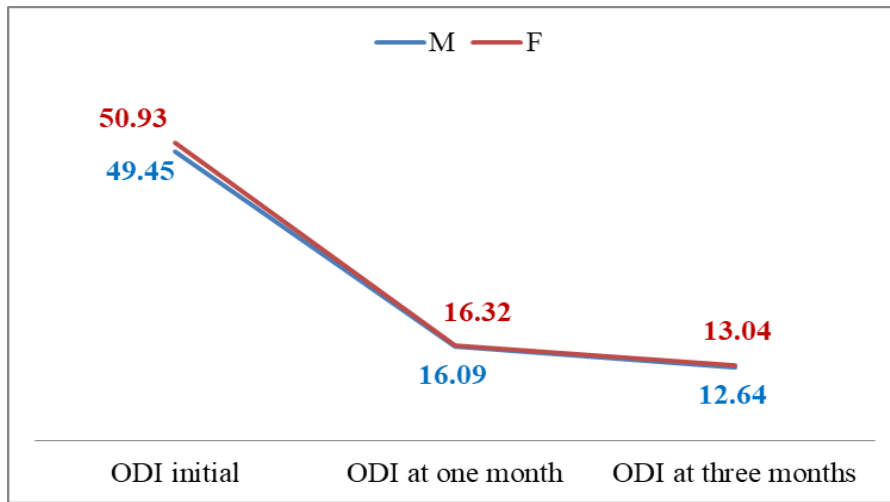


Figure 6: Evolution based on the average ODI indicator from preoperative to 3 months considering the sex of patients

Table 5: Evolution based on the average ODI indicator from preoperative to 3 months considering the age of patients

		Mean	Std. Deviation	Minimum	Maximum	Sig.
ODI initial	<40	45.6364	12.31548	31	65	0.001
	40-60	48.4762	9.07217	32	61	
	>60	55.2222	9.32925	38	70	
ODI at one month	<40	16.9091	4.12783	8	25	0.442
	40-60	15.7619	3.05885	11	23	
	>60	16.3333	3.4641	11	21	
ODI at three months	<40	13.8182	4.06655	7	23	0.324
	40-60	12.7619	3.58731	7	19	
	>60	12.3889	3.11932	7	18	

In the case of the evolution of the ODI indicator according to age, an improvement is observed from one stage to another regardless of the patients' age. A statistically significant association (Sig. = 0.001 <0.05) is identified between age and preoperative ODI, in the sense that as patients age, the ODI indicator score increases preoperatively or in other words, the patients' age increases. the value of the preoperative ODI indicator also increases

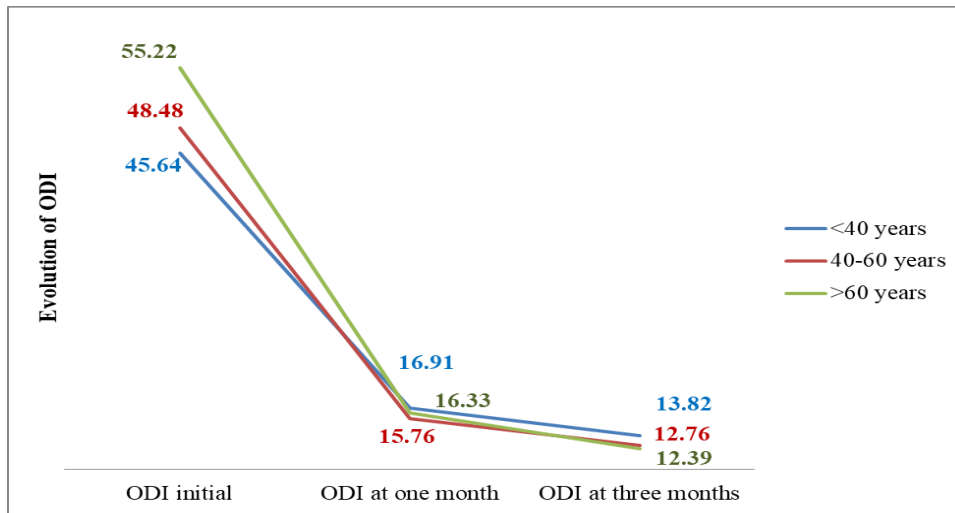


Figure 7: Evolution based on the average ODI indicator from preoperative to 3 months considering the age of patients

Table 3: Presence of polydiscopathy, DM / HTA / Chronic antiplatelet treatment, recurrence and paresis depending on the age of the patients

		Age		
		<40 years	40-60 years	>60 years
Polidiscopathy	M	3	7	6
	F	3	11	4
DZ/HTA/Antiplatelet chronic therapy	M	2	6	6
	F	4	14	6
Recidive	M	2	7	2
	F	2	4	3
Paresis	M	4	2	2
	F	8	4	6

Polydiscopathy occurs more frequently in males (7/7%) and females (11/11%) aged between 40 and 60 years. DM / HTA / Chronic antiplatelet treatment is more common in females (14/14%) aged between 40 and 60 years, while paresis is more common (8/8%) in women under 40 year old. Recurrence of the disease is more common (7/7%) in men aged between 40 and 60 years.

Table 4: Evolution based on the average of the ODI indicator from preoperative at 3 months considering the presence of polydiscopathy, DM / HTA / Chronic antiplatelet treatment, recurrence and paresis

Prezence	Polidiscopathy			HTA/DZ			Recidive			Paresis		
	ODI initial	ODI at one month	ODI at three months	ODI initial	ODI at one month	ODI at three months	ODI initial	ODI at one month	ODI at three months	ODI initial	ODI at one month	ODI at three months
Mean	50.76	16.21	12.85	55.05	17.53	14.37	55.10	16.65	13.25	53.92	16.69	13.15
Std. Deviation	10.06	3.32	3.84	9.62	3.18	3.40	8.88	3.65	3.77	11.98	3.18	3.90
Minimum	32	11	7	35	13	7	38	12	7	33	13	7
Maximum	70	25	23	70	25	23	70	23	19	69	25	23
Sig	0.744	0.977	0.989	0.000	0.003	0.001	0.020	0.426	0.443	0.041	0.420	0.626

Based on the average obtained in the presence of polydiscopathy, DM / HTA / Chronic antiplatelet treatment, recurrence and paresis in the three analyzed moments, significant improvements are observed from one moment to another. Statistically significant associations are identified in the case of the present hypertension / DM and ODI values in the operator (Sig = 0.000), at one month (Sig = 0.003), at 3 months (Sig. = 0.001), registering higher values of the indicator. In case of associating the recurrence (Sig. = 0.020) and the paresis (Sig = 0.041) with the ODI values registered in the preoperator, their presence leads to obtaining a higher ODI score.

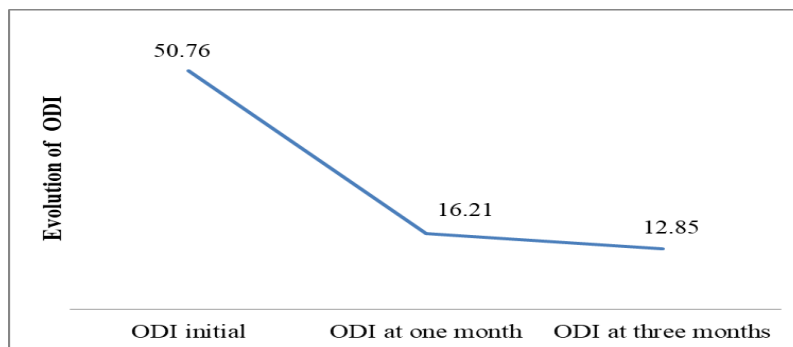


Figure 8: Evolution based on the average of the ODI indicator from preoperative to 3 months considering the presence of polydiscopathy

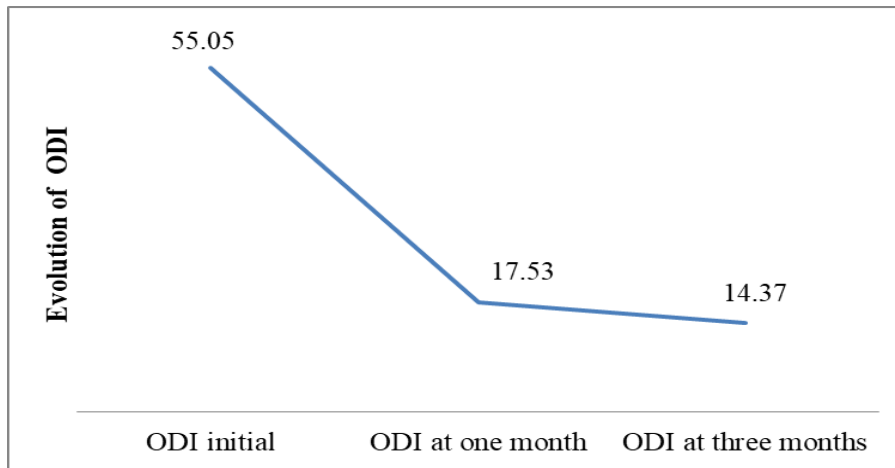


Figure 9: Evolution based on the average ODI indicator from preoperative to 3 months, considering the presence of comorbidities (DM / HTA / Chronic antiplatelet treatment).

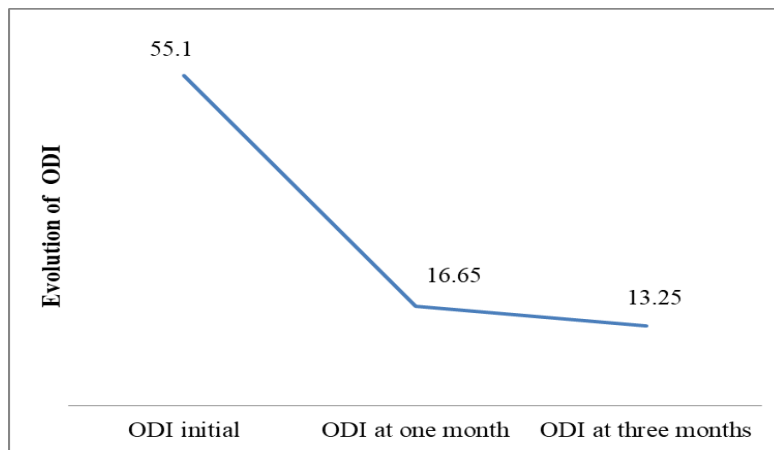


Figure 10: Evolution based on the average of the ODI indicator from preoperative to 3 months, considering the presence of recurrence, preoperative

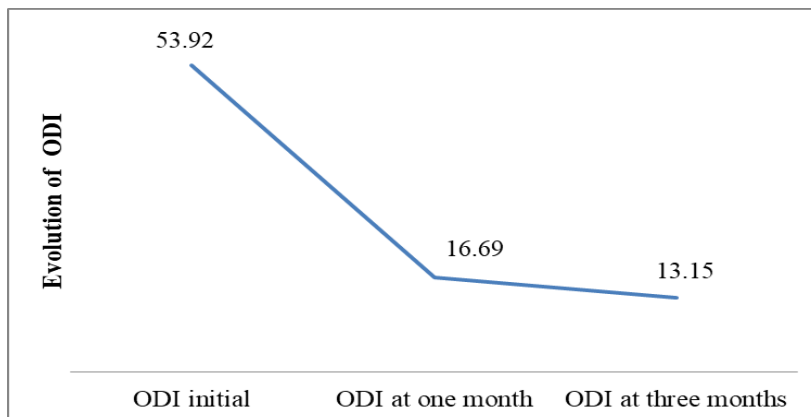


Figure 11: Evolution based on the average of the ODI indicator from preoperative to 3 months, considering the presence of motor deficit, preoperatively

Table 5: Evolution based on the average of the ODI indicator from preoperative to 3 months considering the residence

		Mean	Std. Deviation	Minimum	Maximum
ODI Initial	R	52.087	9.87438	32	70
	U	48.7407	11.01489	31	69
ODI at one month	R	16.6087	3.24878	11	23
	U	15.8889	3.61687	8	25
ODI at three months	R	12.5217	3.19541	7	19
	U	13.1481	3.8235	7	23

Both in the case of patients from rural areas (52.08) and in the case of patients from urban areas (48.74), improvements of the ODI indicator are identified at one month (16.60 / 15.88) and at 3 months (12.52 / 13.14).

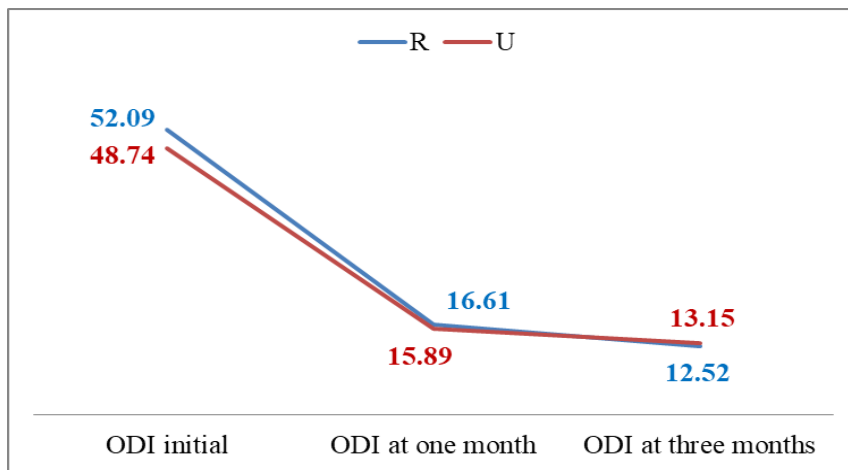


Figure 12: Evolution based on the mean and ODI from preoperative to 3 months taking into account the environment of origin

Table 7

	IMC
ODI initial	0.345**
**Correlation is significant at the 0.01 level (2-tailed).	

There is a statistically significant link of medium intensity ($p = 0.345$) at 99% confidence level between BMI and preoperative ODI. Thus, as the BMI increases, the preoperative ODI score will also increase. There is a higher initial ODI in obese and overweight patients, as well as a more significant decrease of ODI the body weight index decrease.

Table 6: Evolution of ODI according to body mass index

Mean	ODI initial	ODI at one month	ODI at three months
normal weight	43.88	15.33	12.17
overweight	51.02	16.48	13.16
fat	54.77	16.54	12.92

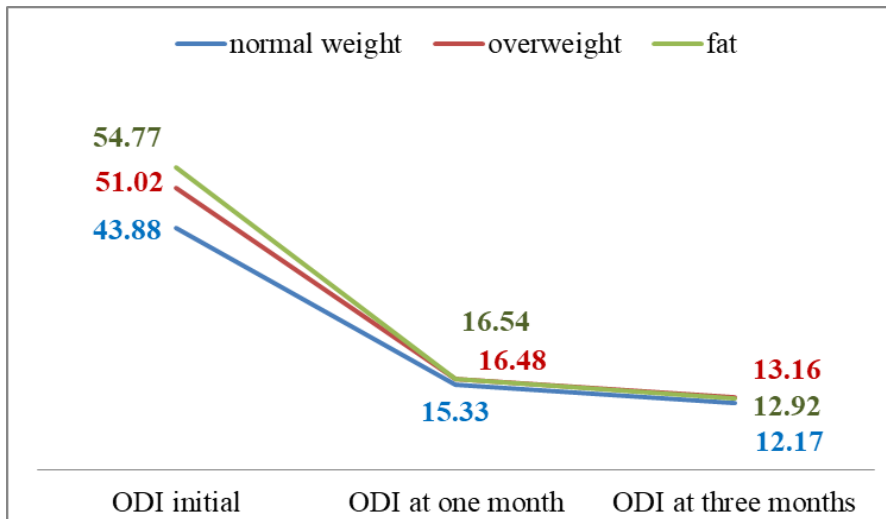


Figure 13: The evolution of ODI according to the patient's body mass index

Table 8

	Correlations		
	ODI initial	ODI at one month	ODI at three months
age	.298**	-.066	-.133

A statistically significant direct and positive association is identified, at a 99% confidence threshold between the age of the patients and the value of the preoperative ODI indicator. The proposed regression model explains (Sig. = 0.003 < 0.05) in proportion of 29.8% ODI variable, and in this case the statistical-mathematical formula becomes $ODI\ preoperatively = 38.420 + 0.233 * Age$, thus increasing the value of the ODI indicator by one year preoperatively increases by 0.233 points / units.

4. Conclusions

- The general evolution of ODI, postoperatively, was significantly favorable, starting from a severe degree of disability, preoperatively and reaching a minor degree of early and late postoperative disability, which showed the efficiency of surgical treatment in hernia of lumbar disc.
- Most patients with lumbar vertebral discopathy and disc herniation with surgical indication, are aged

between 40-60 years, showing that it is a more common pathology in the active population with the presence of age-specific comorbidities.

- Patients with lumbar disc herniation who had comorbidities, such as diabetes and hypertension, had the most favorable evolution of ODI, compared to other aggravating factors of lumbar disc herniation.
- The patients with the highest degree of disability, preoperatively, were those in the age group > 60 years, being able to take into account the disc degeneration given by aging, with the increased risk of disc herniation, as well as the duration of the onset of symptoms. until the presentation to the doctor, during which the motor deficit was installed and was associated with polydiscopathy, aggravating factors of lumbar vertebral discopathy.
- Among the aggravating factors of lumbar vertebral discopathy with herniated disc with operative indication, the presence of motor deficit had the best post-operative evolution, showing that removal of root compression improves the disability index, by remission of motor deficit.
- Patients in rural areas had a higher degree of disability, an aggravating factor being their occupational factor, with the predominance of physical work, which caused a higher severity of herniated disc.
- Among the aggravating factors of lumbar disc herniation, polydiscopathy had the lowest rate of disability, preoperative, which shows that not the number of hernias, but their severity give a more severe degree of ODI.
- Obesity plays an important role in the occurrence and recovery postoperatively, noting that obese patients have a higher rate of disability, preoperatively and postoperatively, compared to normal weight patients.

5. Discussions

Even if pain is a subjective parameter, it can be quantified by the functional impotence it produces, with the patient's inability to perform routine activities. Lumbar vertebral pathology affects a wide range of patients, both female and male, from young age to old age, affecting both people and people working in both urban and rural areas. Surgery in lumbar vertebral discopathy, with herniated disc, is a therapeutic variant with good results related to the improvement of the degree of disability produced by disc herniation. The post-operative results are variable from patient to patient and depend very much on the severity of the disc pathology, as well as on the associated pathology but also on the occupational factor and the observance of the post-operative rest, with impact on the post-operative recovery. To my knowledge, the study has a character of originality in Romania, because no similar study has been published so far. The results of the study can be compared with the study conducted by Hooshang S., Arash V. I, who conducted a prospective study on a group of 100 patients, preoperative and postoperatively, for 1 year, which showed that patients with moderate disability (25% -40%), preoperatively did not have a significant improvement in the disability index, while patients with disability had a marked decrease in the disability index ($P = 0.018$), while in the present study , the decrease is significant regardless of the initial degree of disability. The reduction of the degree of disability can also be compared, in the previous study being a greater decrease in males, unlike the present study, where females show a more pronounced reduction of the disability index, postoperatively [6].

Acknowledgements

„This work is supported by the project ANTREPENORDOC, in the framework of Human Resources Development Operational Programme 2014-2020, financed from the European Social Fund under the contract number 36355/23.05.2019 HRD OP /380/6/13 – SMIS Code: 123847.”

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