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Low Back Pain Physiotherapy: Does Expectation Really Influence Outcome?

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Abstract

BACKGROUND: Physiotherapy has long been prescribed to Low Back Pain (LBP) patients, but treatment outcome measurements along with the influencing factors have not been widely evaluated.

AIM: In this study, we aim to assess the correlation between patient's expectation and LBP physical therapy outcome.

METHODS: This was an observational prospective cohort study conducted at a physical rehabilitation outpatient clinic in September-December 2019. Study population was all patients with LBP complaints who came to the clinic during the study period. Inclusion criteria were patients who underwent physical therapy and willing to participate in this study. Exclusion criteria were patients with malignancy, infection, or fracture in the spinal area. Depending on the chronicity, patients may be treated only with modality or in combination with exercise therapy. One series of physical therapy consists of 5 sessions that lasted for 2.5 weeks. Oswestry disability index (ODI) score was used to evaluate treatment outcome and the Stanford Expectation of Treatment Scale score was used to evaluate patient's expectation. Data were collected twice, before and after 1 series of therapy. Mann-Whitney and Kruskal-Wallis tests were used for the statistical analysis.

RESULTS: There were 91 participants with LBP enrolled in this study. Most patients reported a significant decrease in ODI score, irrespective of the LBP chronicity or nutritional status. However, patients who received both physical exercises and modalities reported lower after therapy ODI than those who only received modalities ($p = 0.009$). No correlation was found between positive ($p = 0.567$) or negative ($p = 0.910$) expectations with ODI improvement.

CONCLUSION: There was no correlation between treatment outcome and patient's expectation.

Introduction

Low back pain (LBP) is a debilitating disease and a common complaint among adults of working age population. Starting from the third decade, its prevalence continues to rise until it gradually falls around the seventh decade of life [1]. LBP takes a hefty toll on healthcare fund, costing an estimate of US $100 billion in USA [2], AUD $9.17 billion in Australia [3], €3.5 billion in the Netherlands [4], €6.6 billion in Switzerland [5] and €48.96 billion in Germany [6]. Globally, it is prevalent in 1.4 to 20.0% of the whole population [7].

LBP is suffered by almost 1 out of 10 people worldwide (9.4%), and has ranked first in terms of disability according to the Global Burden of Disease study in 2010 [8]. In Indonesia, no data on nationwide prevalence is currently available. However, a study by Novitasari *et al*. (2016) in the West Java region found that the prevalence of LBP was 38.3% among adult population [9]. A supporting study by Purwata *et al*. (2015) also stated that pain, more specifically neuropathic pain, was the number one complaint that brought patient to the clinic [10].

Treatment recommendations are abundant, including bed rest avoidance, patient reassurance, psychosocial strategies such as cognitive behavior therapy, and multidisciplinary rehabilitations. Hitherto, all guidelines recommend exercise therapy for acute and chronic LBP, despite the different suggestions of exercise program in each guideline. Medications such as nonsteroidal anti-inflammatory drugs are also recommended by most guidelines, followed by weak opioids, antidepressants, and muscle relaxants when necessary [11].

To evaluate the treatment outcomes, there are several patient-reported outcome measurements (PROMs) tools available, such as numerical rating scale, Roland-Morris disability questionnaire, Oswestry disability index (ODI), pain self-efficacy questionnaire (PSEQ), and patient-specific functional scale (PSFS). The most effective tool, however, has yet been concluded. A study found the PSEQ and PSFS to be superior than the others, whereas another proposed the

usage of BPFS to be better for clinical practice [12], [13]. However, not every center uses PROM in daily practice due to various reasons. Time consuming, difficult for patients to understand and time consuming for clinicians to interpret and score was among the top barriers proposed [14], Despite the barriers, using PROM in routine practice is very advantageous, especially in patients with LBP. It is because PROM help physicians to create more structured assessment with clinical reasoning, to obtain patient's view of pain experience, to educate and motivate the patients, and to communicate with other health care professionals [15].

Along with PROM implementation, patient expectancy questionnaire could also be added to routine clinical assessment. A study by Eklund *et al*. (2019) found that patients' expectancy of their improvement influences the outcome of their LBP therapy [16]. This finding supports an earlier study, which concluded that patients' belief of treatment credibility and expectancy affects their outcome after active intervention [17]. However, no study has been conducted in Indonesia regarding this. Thus, this study aims to assess the relationship between patients' expectation and functional outcome after a physical rehabilitation intervention in LBP patients.

Methods

This was an observational prospective cohort study, conducted in September-December 2019 at a physical rehabilitation outpatient clinic of one of a private hospital in Surabaya, East Java, Indonesia. Participants of this study were patients with LBP that was referred by the clinician to be treated with physical therapy to reduce their LBP complaints. Total sampling method was used in this study. The inclusion criteria were patients with LBP symptoms who presented from September 2019 to December 2019 and were willing to participate in this study. The exclusion criteria were malignancy of the spinal column, spinal cord infection, infection of the spinal area, and vertebral fractures. Dropout criteria were patients who did not complete one series of physical therapy.

One series of physical therapy consists of five sessions of modality only or modality with exercise therapy; one patient underwent two sessions per week. The exercise therapy regiment used in the hospital consists of Williams flexion exercise combined with core-strengthening yoga (bridge and cobra pose). The modalities used are short wave diathermy, ultrasound diathermy, transcutaneous electrical stimulation, and laser. Patients were only given modality treatments when the pain was still acute and unbearable. In patients with chronic or subdued pain, a combination of modalities and exercise were given.

The patients were grouped as geriatrics and non-geriatrics with a cutoff age of 65 years old. Participants' body mass index (BMI) was classified according to Asian criteria defined by WHO [18]. The chronicity of LBP was classified as: acute (<6 weeks), subacute (6–12 weeks), and chronic (>12 weeks) [19].

ODI questionnaire's score ranges from 0% to 100%, with the following interpretations: 0–20% as minimal disability, 21–40% as moderate disability, 41–60% as severe disability, 61–80% as crippled, and 81–100% as bed-bound/exaggerating [20]. Stanford Expectation of Treatment Scale (SETS) questionnaire is a 6-items questionnaire consisting of 3 questions that assess positive expectation, and three questions that assess negative expectations. Each questions' answer was scored according to Likert scale (1–7). The final score of either positive or negative expectancy is the average total of each 3 questions. This questionnaire has been validated and calculated Cronbach α value for the positive expectancy is 0.86, and the value for negative expectancy is 0.81 [21].

Before the therapy began, participants were asked to fulfill a demographic characteristic, ODI [20], and SETS [21] questionnaires. After completing 1 series of therapy, the participants were asked to fulfill ODI questionnaire again to assess post-therapy symptoms. Data collection was conducted by AO. To reduce the bias, clinicians who worked at the physical rehabilitation outpatient clinic did not interview the participants.

This study followed the principles of the Declaration of Helsinki and has received an approval from the ethical committee unit of the hospital where the study was conducted. All participants gave their informed consent before their inclusion in this study. Details that might disclose participants' identity were omitted.

The normality of the data was analyzed using the Shapiro-Wilk test. Normally distributed data were presented in mean ± SD, while abnormally distributed data were presented in median (IQR). The comparison of pre-physical therapy ODI, post-physical therapy ODI, and Δ ODI in variables with two groups were conducted using the Mann-Whitney test; the comparison of pre-physical therapy ODI, post-physical therapy ODI, and Δ ODI in variables with more than two groups were conducted using Kruskal-Wallis test. All statistical analyses were conducted using the SPSS Statistics for Windows version 25.0 (Armonk, NY: IBM Corp.). p-value <0.05 was considered statistically significant.

Results

Patients' characteristics

There was a total of 91 participants in this study. The average age of participants was 52.85 years

old, with 30% of them being geriatrics. There was a female predominance among the participants. More than one-third of the participants had bachelor's degree. Only 27.2% of the participants had normal BMI. The most common comorbidity among the participants was dyslipidemia, followed by hypertension. The details of participants' characteristics are depicted in Table 1. From the profile of participants, we see a pattern of LBP being suffered by mostly female of working age and higher BMI.

Table 1: Characteristics of the study participants

Characteristics of the participants	n = 91 n (%)
Age group	
<65 years old	63 (69.2)
≥65 years old	28 (30.8)
Sex	
Male	34 (37.4)
Female	57 (62.6)
Education Level	
Elementary school	10 (11.0)
Junior high school	15 (16.5)
Senior high school	25 (27.5)
University graduate	41 (45.1)
Body mass index	
Underweight (<18.5 kg/m^2)	1 (1.1)
Normal (18.5–22.9 kg/m^2)	24 (26.4)
Overweight (23.0–27.5 kg/m^2)	42 (46.2)
Obese (>27.5 kg/m^2)	24 (26.4)
Comorbidity	
Hypertension	22 (23.9)
Diabetes mellitus	19 (20.7)
Dyslipidaemia	37 (40.2)
Coronary heart disease	5 (5.4)
Gout	12 (13.0)
Rheumatoid arthritis	2 (2.2)
Benign prostate hyperplasia	2 (2.2)
Parkinson's disease	2 (2.2)

LBP characteristics

More than half of the participants had acute LBP. Two of the most common cause of LBP was muscle spasm and herniated disc, which accounted for more than half of all aetiologies. Proportions of participants who were treated with modality alone and combination of modality of strengthening exercise were about the same. More than half of the participants had a history of LBP treated with physical therapy. The details of LBP characteristics among the participants are depicted in Table 2.

ODI

All participants experienced a significant improvement of ODI after a series of physical therapy ($p < 0.001$). Geriatric group, however, still had a higher post-therapy ODI compared to their younger counterpart ($p = 0.005$). The ODI scores of male and female participants were not significantly different before therapy, but the ODI score of the female participants after therapy was significantly higher ($p = 0.010$). There was no difference in ODI score between participants with different nutritional status, both before and after therapy session. There was also no difference of ODI score between participants with different LBP chronicity, either before or after therapy session. The participants who were treated with a combination of modality and strengthening exercise reported lower ODI score after therapy ($p = 0.009$). All participants experienced a significant improvement of ODI after a series of physical therapy ($p < 0.001$). Details of the relationship between ODI and other variables are depicted in Table 3. From the data, we can conclude that no single variable really played a huge role in determining the amount of ODI point reduction. Geriatric patients still scored the highest post-therapy ODI ($p = 0.005$), possibly due to degenerative processes that are already present. The participants who were treated with a combination of modality and strengthening exercise reported lower ODI score after therapy ($p = 0.009$), which might suggest that exercise plays a role in reducing the ODI score.

Table 2: Low back pain characteristics among study participants

Low back pain characteristics	n = 91 n (%)
Chronicity	
Acute	51 (56.0)
Sub-acute	16 (17.6)
Chronic	24 (26.4)
Main diagnosis	
Muscle spasm	27 (29.7)
Degenerative disc disease	3 (3.3)
Herniated Disc	26 (28.6)
Lumbar spondylosis	10 (11.0)
Spondylolisthesis	8 (8.8)
Canal stenosis	12 (13.2)
Trauma	1 (1.1)
Ankylosing spondylitis	1 (1.1)
Physical therapy approach	
Modality only	52 (57.1)
Modality and exercise	39 (42.4)
Previous physical therapy	
Yes	42 (46.2)
No	49 (53.8)
ODI category before therapy	
Mild	28 (30.8)
Moderate	34 (37.4)
Severe	24 (26.4)
Crippled	4 (4.4)
Bed-bound/exaggerating	1 (1.1)
ODI category after therapy	
Mild	61 (67.0)
Moderate	25 (27.5)
Severe	5 (5.5)
Crippled	0 (0)
Bed-bound/exaggerating	0 (0)

ODI: Oswestry disability index.

Table 3: Oswestry disability index (ODI) according to age, sex, and body mass index (BMI)

Variables	Pre-physical therapy ODI Median (IQR)	Post-physical therapy ODI Median (IQR)	ΔODI Median (IQR)
Age group			
Geriatric	32.00 (21.00)	21.00 (19.00)	12.00 (19.00)
Non-geriatric	26.00 (28.00)	14.00 (17.00)	14.00 (14.00)
p-value	0.179[§]	0.005[§*]	0.168[§]
Gender			
Male	26.00 (21.00)	12.00 (19.00)	16.00 (15.00)
Female	32.00 (26.00)	18.00 (18.00)	12.00 (18.00)
p-value	0.063§	0.010§*	0.780§
Nutritional status			
Underweight	–[α]	–[α]	–[α]
Normal	27.00 (22.00)	15.00 (13.00)	11.00 (17.50)
Overweight	32.00 (27.00)	19.00 (19.00)	15.00 (16.50)
Obese	26.00 (26.00)	11.00 (21.00)	14.00 (22.50)
p-value	0.282[ł]	0.230[ł]	0.557[ł]
Low back pain chronicity			
Acute	32.00 (24.00)	16.00 (20.00)	14.00 (18.00)
Subacute	25.00 (24.00)	13.00 (14.00)	13.00 (17.00)
Chronic	27.00 (29.00)	13.00 (26.00)	13.00 (17.00)
p-value	0.537[ł]	0.529[ł]	0.864[ł]
Physical therapy approach			
Modality only	31.00 (23.00)	19.00 (20.00)	14.00 (15.50)
Modality and exercise	26.00 (28.00)	12.00 (18.00)	14.00 (16.00)
p-value	0.187[§]	0.009[§*]	0.844[§]

ODI: Oswestry disability index, [§]p-value from Mann-Whitney U test, [ł]p-value from Kruskall-Wallis test, *p-value < 0.05, [α]Only one participant in this category.

Participants' positive and negative expectations

Our results showed that female participants generally had higher positive expectation compared to male participants (p = 0.019). Other than that, we found that age group, chronicity of LBP, and physical therapy approach did not affect both positive and negative expectation (Table 4). This shows that expectations are independent from aforementioned factors.

Table 4: Participants' positive and negative expectations

Variables	Positive expectation median (IQR)	Negative expectation median (IQR)
Age group		
Geriatric	6.67 (1.00)	1.00 (0.00)
Non-geriatric	6.33 (1.33)	1.00 (0.00)
p-value	0.338[§]	0.676[§]
Gender		
Male	6.33 (1.33)	1.00 (0.00)
Female	6.67 (1.00)	1.00 (0.00)
p-value	0.019[§]*	0.618[§]
Nutritional status		
Underweight	-[α]	-[α]
Normal	6.67 (1.50)	1.00 (0.00)
Overweight	6.63 (1.33)	1.00 (0.00)
Obese	6.67 (1.25)	1.00 (0.00)
p-value	0.953[ł]	0.657[ł]
Low back pain chronicity		
Acute	6.67 (1.00)	1.00 (0.00)
Subacute	6.67 (0.58)	1.00 (0.00)
Chronic	6.00 (1.50)	1.00 (0.00)
p-value	0.054[ł]	0.173[ł]
Physical therapy approach		
Modality Only	6.67 (1.33)	1.00 (0.00)
Modality and Exercise	6.33 (1.00)	1.00 (0.00)
p-value	0.380	0.435

[§]p-value from Mann-Whitney U test, [ł]p-value from Kruskall-Wallis test, *p-value<0.05, [α]Only one participant in this category.

The relationship between participants' expectations and ODI score

The data of ODI difference before and after therapy (Δ ODI), the positive expectation, and the negative expectation were not normally distributed. The median (IQR) of Δ ODI was 14.00 (16.00); of positive expectation was 6.67 (1.33); of negative expectation was 1.00 (0.00). Pre-physical therapy ODI showed no significant correlation with both positive (p = 0.249) and negative (p = 0.890). Likewise, post-physical therapy ODI was not correlated to positive (p = 0.819) and negative (p = 0.564) expectation. Furthermore, our analysis showed there was no correlation between ΔODI and positive expectation (p = 0.567); the same relationship applied to negative expectation (p = 0.910). To conclude, this showed that treatment outcome was not associated with the expectations.

Discussion

In our study, there was a higher number of non-geriatric participants compared to the geriatric participants. This aligns with the findings of a systematic review by Hoy *et al*. (2012) which concluded that the peak of LBP prevalence occurs between 40 and 69 years old. The prevalence would decline in older age group [22]. We also observed that more than half of the participants were female. A review concurred with this result; the review found that the prevalence of LBP is higher in females across all age groups. The possible causes are psychological factors and hormonal changes due to menstruation and menopause [23].

Most of the participants were overweight or obese according to Asian criteria by the WHO [18]. This is not surprising, as higher BMI is associated with increased prevalence of LBP but is not correlated with LBP's severity and frequency [24]. High BMI is also associated with higher prevalence of hypertension and dyslipidemia [25]. Hypertension and dyslipidemia were also the two most common comorbidities among the participants in our study. Hypertension itself is an independent risk factor of lumbar disc degeneration, a risk factor of LBP [26]. Several studies mentioned that dyslipidemia is a risk factor for LBP and lumbar disc degeneration; one explanation is that the atherosclerosis of lumbar arteries would lead to more severe lumbar disc degeneration [27], [28].

LBP in older individuals tends to be more complex and severe due to various etiopathologies. Moreover, high prevalence of depression in this age group could further aggravate the condition [29]. When we compared the ODI score of the geriatrics and non-geriatrics, however, there was no difference in pre-physical therapy ODI. One possible explanation is that all the participants in our study were LBP patients who were deemed fit enough to undergo physical therapy as an outpatient. Among our population, we observed an empirical fear to surgical therapy, thus physical therapy is often sought before surgery. Jawaid *et al*. (2007) mentioned that preoperative anxiety is common among patients who are going to undergo elective surgery [30]. Older adults are especially prone to preoperative anxiety and psychological problems which may impact the outcome of surgery.

On the contrary, the post-physical therapy ODI of non-geriatrics group was significantly lower compared to the geriatrics even though all participants experienced significant ODI improvement after physical therapy. The lesser improvement in geriatrics participants could be caused by the maladaptive pain response in older people. Older people has a faster and longer-sustained substance P production compared to younger people [31]. This might impact the functional outcome measured in this study. However, there was no significant difference between the ΔODI of the geriatrics and non-geriatrics group. This suggests both groups benefitted from the physical therapy session. Previous study also found that exercise therapy is beneficial to both geriatrics and non-geriatrics [32].

Although there was no pre-physical therapy ODI difference between male and female participants, post-physical therapy ODI was significantly lower in male participants. This result is contrary to the

finding by Pieh *et al*. (2012) who found that female experienced more improvement regarding functional disability after multimodal pain therapy [33]. In our study, the pain therapy was only limited to physical therapy. Meanwhile, in the previous study, multimodal pain therapy including supportive therapy such as grouped session and counseling were used. Since women benefited more from supportive therapy, this might explain the difference in our finding [34].

Interestingly, there were no differences of pre-physical therapy and post-physical therapy ODI and ΔODI across different nutritional status. Higher BMI is associated with higher prevalence of LBP [35], [36]. However, a study concurs that BMI does not affect patients' outcome after LBP physiotherapy [37].

There were also no differences of pre-physical therapy and post-physical therapy ODI and ΔODI among participants with acute, sub-acute, and chronic LBP. In contrast, Walston and McLester (2020) found that the earlier the physical therapy is instated, the better outcome the patients will experience [38]. We propose that the difference is because the number of samples in our study was very low compared to previous study. Our participants were also predominated by acute LBP, whereas previous study's samples were predominated by chronic LBP.

The post-physical therapy ODI of the participants treated with combination of modalities and strengthening exercise was significantly lower than those treated with modalities only. Strengthening exercise is proven to alleviate LBP symptoms in the elderly [39]. Our result suggests that the combination of strengthening exercise with modalities is superior than using modalities alone. Combination of modalities and exercise is also superior to exercise alone [40]. This could imply that the combination of modalities and exercise may deliver a more satisfactory physical therapy outcome in patients with LBP.

When we compared the positive and negative expectations of the participants in regard to age group, gender, nutritional status, LBP chronicity, and physical therapy approach, the only significant difference was found between male and female participants' positive expectations; female participants had slightly higher positive expectation compared to male participants. Moreover, there was no correlation between both positive and negative expectation with the pre-and post-therapy ODI score; there was also no correlation between ΔODI and patients' positive and negative expectations. On the contrary, a recent randomized controlled trial found that expectation is a predictor of LBP therapy outcome [16]. The possible explanation to this absence of correlation is that most of our patients had high positive expectation and low negative expectation. It could be that this pattern of expectation is due to the fact that all our participants underwent physical therapy in a private hospital; most of them had excellent access to healthcare. There is one study which mentions access to healthcare is a determinant factor affecting patient's expectation of therapy [41]. We also suggest that because all participants were funding their therapy privately, they tend to expect a more positive outcome from their therapy session.

Conclusion

We found that patient's expectation did not influence therapy outcome. There is, however, better improvement in patients who underwent physical exercise in addition to receiving modalities compared to those who only received modalities.

Recommendations

This study has several limitations: the participants are from a single-center, and the time and number of participants were limited. Ensuing studies should include more participants from multiple centers, both public and private, to better assess the relationship between patients' expectation and therapy outcome. Furthermore, trial study should be conducted in the future to explore the possible therapy combination to achieve best improvement among LBP patients.

Ethical Approval

This study follows the Declaration of Helsinki and approved by the Ethics Committee from the hospital where the study was conducted (Ethical clearance number: 02/PERS-EC/RSOT/X/2019). Written informed consent was obtained from all patients before their inclusion in the study. Information for informed consent was given before the patients signed the informed consent.

Authors Contribution

AO designed the study, conducted the research, collected and organized the data, and revised the manuscript for important intellectual content. WPS designed the study, analyzed the data, and wrote the initial draft. SII conducted research, collected and organized the data, and revised the manuscript for

important intellectual content. ACS designed the study and wrote the initial draft. FFA analyzed the data and revised the manuscript for important intellectual content. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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