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Differences between *SNAGS* and *Mc Kenzie* Interventions with *Core Stability* and *Mc Kenzie* on the Functional Ability of Elderly People with Lumbar HNP Conditions at Hermina Hospital Depok

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ABSTRACT

HNP *is a degenerative disease where the elasticity of the annulus fibrosus decreases so that it becomes one of the causes of* LBP *and often occurs in the elderly. One of the roles of physiotherapy in HNP cases can be treated with exercise therapy, with the* SNAGS *and Mc Kenzie intervention methods as well as with Core Stability and Mc Kenzie. To help improve the functional abilities of the elderly. The purpose of the study is to determine the differences in interventions for Lumbar HNP cases using the* SNAGS *and Mc Kenzie methods as well as Core Stability and Mc Kenzie on the functional abilities of the elderly. The design of this study used a quasi-experimental with two groups pre-post test. A sample of 22 people was selected by purposive sampling which was divided into two, namely treatment 1 and treatment 2. The research was conducted for 4 weeks consisting of one pretest, with meetings twice a week with a duration of 30-45 minutes and one post-test. The instrument used is the ODI questionnaire. The result showed that the normality test using the Shapiro-Wilk test resulted in a value of p=0.000, which means it was significant in both treatment groups. From the results of the paired test, it is significant with a value of p = 0.000 meaning p <0.05. The reduction of the difference in the percentage of disability in treatment group 1 was -32.55 per cent, and in treatment group 2 was -37.27 per cent. The conclusion from the study is* SNAGS *and Mc Kenzie interventions as well as Core Stability and Mc Kenzie can affect the functional abilities of the elderly. With more effective results on Core stability and Mc Kenzie interventions in improving the functional abilities of the elderly with Lumbar* HNP *conditions.*

Keywords*:* HNP, SNAGS, *Mc Kenzie, Core Stability, Elderly*

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INTRODUCTION

Health Law No. 36 of 2009 is a government effort to explain the meaning of health, namely mentally, physically and socially so that you can do things that are productive and economical. Health is the right of all people, including the elderly (Sipayung, Anggiat and Soeparman, 2020)

UU no. 13 of 1998 explains that it is considered elderly if a person is over 60 years old (Ministry of Health of the Republic of Indonesia, 2013). At this age, humans will experience various changes in all aspects of life, especially health, including biological, sexual, emotional, social and spiritual changes. (Wijoyo & Daulima, 2020).

One of the studies regarding the welfare of the elderly (men and women) aged 60 years and over who experienced a natural decline in physical and psychological abilities which resulted in slowed movements, shorter footsteps, and decreased muscle strength, especially in the lower limbs. Reduced leg strength means that you cannot tread firmly and are unstable, so steps must be taken to anticipate balance problems such as slipping and tripping. (Sipayung, Anggiat and Soeparman, 2020)

Jumping, running, exercising and walking normally are difficult things for the elderly because their health, especially their

physical health, is declining. (Ariyanto *et al*., 2020).

In the elderly, namely, those aged 60-70 years, pathological processes are often found that cause a decrease in balance and deviations in gait, one of which is characterized by a slowed walking pattern. Changing walking patterns in the elderly is an effort to improve balance. Limited activity and abnormal motor skills are caused by *impaired* balance whose function decreases so elderly people often use assistive devices or help from other people in carrying out their activities. Improving health, and physical and social quality will certainly increase life expectancy. According to WHO, there will be an increase of ± 600,000,000 to 2,000,000,000 elderly people by 2050. The Asian region will have an elderly population that will increase by 82 per cent in the next 25 years (Wijayani *et al*., 2022).

A total of 9.03 per cent or 23.66 million people is the projected data for elderly people in Indonesia in 2017. The elderly population in 2020 is estimated to reach 27.08 million, in 2025 (33.69 million), and in 2030 (40, 95 million), while in 2035 it could reach 48.19 million. The elderly have a decline in physical and psychological development which leads to negative, causing dependency (Adi *et al*., 2020).

Problems that often occur in the elderly include not having access to education, health, old age security, social support from family and friends and physical exercise (Ariyanto *et al*., 2020).

Disorders that occur in the elderly include 25 per cent needing hospitalization for further evaluation, 20 per cent of sufferers of which 13 per cent need medical assistance and 40 per cent experience sleep disorders (Nugroho *et al*., 2018).

Low back pain affects 80 per cent of the population once in a lifetime. According to health workers in Indonesia, the prevalence of *musculoskeletal* disease in Indonesia is 11.9 per cent based on diagnosis and 24.7 per cent with symptomatic diagnosis, while the highest prevalence of the *musculoskeletal* disease is 31.2 per cent for those who work as farmers, fishermen or labourers. At the age of 35-55 years, there will be a decline and abnormalities in the *intervertebral discs* so the risk of *lower back pain* will be higher (Rikesdas, 2013).

One of the causes of lower back pain is *Herniated Nucleus Pulposus* (HNP), which means a long-term condition of protrusion of the *intervertebral disc* caused by *injury* and incorrect mechanical load. However, the main cause of HNP is the tearing of the *annulus fibrosus* which results in decreased elasticity due to degeneration (Widyasari & Wulandari, 2020).

Complaints that are felt if HNP occurs are decreased muscle strength which interferes with the patient's activities, limited joint movement, pain and tingling in the lower waist to the legs, and spasms (Dwi *et al.*, 2020).

The causes of HNP include degenerative changes which cause decreased flexibility and thinning of the *nucleus pulposus*, and moderate but repeated trauma involving the *intervertebral disc* which results in tearing of the *annulus fibrosus* (Widyasari & Wulandari, 2020).

Based on estimates, 40 per cent of the Indonesian population at the age of 65 years have experienced complaints in the waist with a prevalence in men of 18.2 per cent and women of 13.6 per cent, while the incidence of HNP from patient visits to hospitals is in the range of 3-17 per cent. After headaches, the complaint that ranks second is HNP (Sani & Durahim, 2021).

Based on the survey results at Hermina Hospital, there were 24 respondents as samples, but 2 respondents did not meet the research requirements so the total research sample was 22 elderly patients experiencing Lumbar HNP from December 2022-January 2023. Incidents of lumbar disability experienced by disabled patients when carrying out activities involve lowering movements such as sitting, standing and walking (RS Hermina Depok, 2022).

With the problems experienced by the elderly, the development of physiotherapy treatment emerged (Dwi *et al*., 2020).

Physiotherapy is a form of health service intended for individuals or groups to develop, maintain and restore body movement and function throughout the life cycle using manual treatment, electrical equipment (electrotherapy and mechanical), functional training and communication. (Indonesian Ministry of Health, 2013). Another opinion states that physiotherapy is a provider of health services for individuals and groups to develop, maintain and restore

maximum movement and functional abilities throughout the life cycle (Sipayung *et al*., 2020).

Physiotherapy is an active form of treatment that focuses on joint and muscle movement. (Sipayung *et al*., 2020).

In sufferers of LBP due to HNP, exercise therapy is carried out as a form of physiotherapy (Sipayung, Anggiat and Soeparman, 2020).

The benefits of exercise therapy in the form of body movements, postures and other activities include: correcting or preventing disorders, improving, restoring or increasing physical function, preventing or reducing health-related risk factors, and optimizing health conditions, fitness or overall sense of well-being. (Amin *et al*., 2018).

To reduce movement and function disorders in the elderly, you can use the *Mc Kenzie* method to restore the existing nucleus pulposus and reinsert it into the annulus pulposus (Sipayung, Anggiat and Soeparman, 2020).

Mc Kenzie is a useful exercise for strengthening the back muscles and relaxing the abdominal muscles, strengthening the *transverse abdominis, internal obliquus* and *external obliquus muscles.* (Maycahyasari *et al*., 2022). *Mc Kenzie* has the characteristic that posture correction ensures body posture is in the right condition (Maycahyasari et al., 2022).

Brian R. Mulligan, a physiotherapist from New Zealand, introduced manual therapy for *Spinal sustained natural apophyseal glides* (SNAGS) on the lumbar *vertebrae* which has the characteristic of *mobilization with movement* (MWM) or a combination of accessory passive movements during active or physiological passive movement techniques. SNAGS is *nonoscillatory mobilization* which has been implemented on the lumbar *vertebrae* which is an MWM procedure. SNAGS has been widely applied in *orthopaedic manual physical therapy* (OMPT) because in *vertebral* conditions this technique has been declared effective (Sani & Durahim, 2021).

To produce optimal movement when carrying out activities, it is necessary to increase the trunk muscle groups around the rear driver with *Core Stability* exercises (Tantangan et al., 2021). This aims to improve *neuromuscular* control, endurance, and muscle strength so that the spine is stable and dynamic as shown in research with chronic low back pain. (Harder, 2021). Good *core stability* can function to increase movement and prevent injury because it is an important factor in body posture. In medical literature, core stability is 'the product of motor control and muscle capacity in the *lumbar, pelvic, hip complex'*, in *musculoskeletal* terms including the spine, pelvis and hip joints, as well as the proximal lower extremities in addition to all related muscles. (Zulvikar, 2016).

The general aim of this research is to find out whether there is a difference in administering SNAGS and *Mc Kenzie* measures to the functional abilities of elderly people with Lumbar HNP conditions and to find out whether there are differences in giving *Core Stability & Mc Kenzie* measures to the functional abilities of elderly people with Lumbar HNP conditions. Meanwhile, the specific objective is to determine the actions of SNAGS & *Mc Kenzie* on increasing the functional abilities of elderly people with Lumbar HNP conditions and to find out the actions of *Core Stability & Mc Kenzie* on increasing the functional abilities of elderly people with Lumbar HNP conditions. It is hoped that this research will become a means of increasing the highest level of health for all levels of society as a whole. Apart from that, as a reference for knowing SNAGS actions, *Mc. Kenzie* and *Core Stability* on the functional abilities of elderly people with Lumbar HNP conditions and increasing knowledge of exercise techniques as actions based on physiotherapy science. So that in further research we can find out and understand about the elderly and the condition of Lumbar HNP and prove whether SNAGS, *Mc Kenzie & Core Stability* are effective for the functional abilities of elderly people with Lumbar HNP conditions.

RESEARCH METHOD

Quasi-experimental with a two-group pretest and posttest design is the type of research used in this study using 2 objects, namely treatment group 1 which was given SNAGS & *Mc Kenzie* actions, while treatment group 2 was given *Core Stability & Mc Kenzie* actions. The instruments required in the research consisted of an *informed concern* form, research explanation form, ODI questionnaire, respondents, stationery and a bed for carrying out exercise therapy.

The sample used 24 respondents as a sample, but 2 respondents did not meet the research requirements so the total research sample was 22 elderly patients who were divided into 2 groups, namely 11 people in treatment group 1, namely *snags* and *MC Kenzie* training and 11 people in treatment group 2, namely *core training stability* and *MC Kenzie* at RS Hermina Depok. The sampling technique was simple random sampling with the inclusion criteria of elderly men and women aged over 60 years, willing to take part in the entire research program, able to carry out SNAGS, *Core Stability & Mc. Kenzie's* actions, in Lumbar HNP conditions. Data collection through *pre-test*, research implementation and *post-test*. Sample exclusion criteria *dropped out* due to stopping therapy. Data processing includes *editing, coding, processing* and *cleaning*. Data analysis technique using *graphpad prism*. First, a normality test was carried out using the *Shapiro-Wilk test*, then a hypothesis test was carried out, namely the *Paired t-test* with a significance level of $p<0.05$. The final stage is interpretation and drawing conclusions based on the research results and analysis obtained.

RESULTS AND DISCUSSION

Research result

Table 1. Distribution of Research Samples Based on Age and Gender

Variabel	Kategori	Kelompok perlakuan 1		Kelompok perlakuan 2	
		N	%	n	%
Usia (tahun)	60-70	5	45%	3	27%
	70-80	6	55%	8	73%
Total		11	100%	11	100%
Mean ± SEM		68,9±0,431		71,7±0,373	
Jenis Kelamin	Laki-laki	3	27%	2	18%
	Perempuan	8	73%	9	82%
Jumlah		11	100%	11	100%

Based on Table 1, the age characteristics of this research sample ranged from 60-80 years. In treatment group 1, the largest sample age was between 70-80 years, there were 6 samples (55 per cent), and in 60-70 years, there were 5 samples (45 per cent). In treatment group 2, the largest sample age was also between 70-80 years, there were 8 samples (73 per cent), 60-70 years old, and there were 3 samples (27 per cent). In terms of gender, it was found that women dominated, as shown in treatment group 1, the sample size was 8 female respondents (73 per cent) and 3 male respondents (27 per cent). Meanwhile, in treatment group 2, there were 9 female respondents (82 per cent) and 2 male respondents (18 per cent).

Table 2. ODI (Oswestry Disability Index) pre-test and post-test scores for Treatment Group 1 and Treatment Group 2.

Sampel	Kelompok perlakuan 1		Kelompok perlakuan 2	
	Pre test	Post test	Pre test	Post test
Mean±SEM	61,64%±0,451	29,09%±1,127	64,45%±0,627	27,18%±1,298

Based on the data in Table 2, shows that the post-test score for treatment group 1 has a mean value of 29.09 per cent with an SEM of 1.127, while the *pre-test* score obtained a mean value of 61.64 per cent with an SEM of 0.451. This is related to an increase in functional ability after administering the action. within 4 weeks.

In treatment group 2, it shows that the *post-test* score in treatment group 2 has a mean value of 27.18 per cent with an SEM of 1.298, while the pre-test score obtained a mean value of 64.45 per cent with an SEM of 0.627. This is related to an increase in functional ability after giving the action for 4 weeks.

Table 3. Data normality test with Shapiro Wilk test, pre-test and post-test in treatment group 1 and treatment group 2.

Kelompok	*Shapiro Wilk Test*		
	P value		Distribusi Data
	Pre test	Post test	
Perlakuan 1	0,5584	0,2630	Normal
Perlakuan 2	0,3602	0,8054	Normal

Based on the results of the *Shapiro-Wilk normality* test, the process uses a computerized system using the GraphPad Prism program. Table 3 shows that for each treatment group, both *pre-test* and *post-test*, the *p-value* obtained in treatment group 1, *pre-test* = 0.5584 and *post-test* = 0.2630. In treatment group 2 *pre test* = 0.3602 and *post test* = 0.8054. From the results of this data, $p>0.05$, which means the data distribution is normal, so it is continued with the *paired t-test.*

Table 4. Paired T Test results for hypothesis testing on functional abilities using treatment group 1 and treatment group 2

Paired t Test			
Kelompok	***Mean***	**Sd**	***P Value***
Perlakuan 1	-32,55	11,78	0,000
Perlakuan 2	-37,27	9,678	

The data is presented in the form of mean and standard deviation and then hypothesis testing is carried out using a *paired t-test* with a significance of p<0.05.

Based on the results of data analysis in each treatment group 1 and 2 using a *paired t-test* to see the functional ability of elderly people with *Lumbar* HNP conditions. Based on the results of the paired t-test analysis, the results for treatment group 1 were p = 0.000 (p <0.05), which means Ha was accepted, Ho was rejected, then treatment group 2 was p = 0.000 (p <0, 05) which means Ha is accepted and Ho is rejected, so it can be concluded that there is a significant increase in the functional ability of elderly people with *Lumbar* HNP conditions.

Based on the results of the hypothesis test, it was concluded that the two treatment groups had an increasing effect on the functional abilities of the elderly in *Lumbar* HNP conditions after being given treatment for 4 weeks. The effectiveness of treatments 1 and 2 can be seen by the *mean* difference between the two groups. The average difference value *(mean)* is -32.55 for treatment group 1 and the average difference value *(mean)* is -37.27 for treatment group 2, so it can be concluded that increasing the functional ability of elderly people who experience Lumbar HNP is a more effective treatment intervention 2 (*Core Stability & Mc Kenzie*) than treatment action 1 (SNAGS & *Mc Kenzie*).

Discussion

In this study, changes were found in the ODI (*Oswestry Disability Index*) scores in treatment groups 1 and 2.

Treatment group 1 experienced a change in the ODI (*Oswestry Disability Index*) score with the *pre-test* score being an average of 61.64 per cent and the *post-test* score being an average of 29.09 per cent. This means there is an increase in the functional ability of the elderly in Lumbar HNP conditions. The results of this research are by research from (Sani & Durahim, 2021). The results of the research are that the administration and actions of SNAGs & *Mc Kenzie* influence reducing disability in Lumbar HNP conditions. This is a result of increased functional ability so that joint and muscle movements experience increased strength.

Meanwhile, in treatment group 2 there was a change in the ODI (*Oswestry Disability Index*) score with the *pre-test* score being an average of 64.45 per cent and the *post-test* score being an average of 27.18 per cent. This means there is an increase in the functional ability of the elderly in Lumbar HNP conditions. These results are in line with research (Tantangan *et al*., 2021) which reveals that these two methods are equally effective in increasing functional ability and can reduce lumbar HNP because these two methods impact the stabilizer muscles in the spine to become strong and relaxed, posture The body's faults are repaired so that joint pressure and ligament stretching are reduced, which can increase analgesic function, which is the function of the *β-endorphin* hormone. By carrying out regularly using the *Core Stability & Mc Kenzie* method, HNP sufferers will relax and improve their back muscles

This exercise can have an impact on not disrupting social life and functional activities by improving lower back disability in Lumbar HNP sufferers. (Zahratur & Priatna, 2019).

Based on the results of the normality test using the *Shapiro-Wilk* test, from the analysis of each treatment group, both *pre-test* and *post-test*, the *p-value* for treatment group 1, *pre-test* = 0.5584 and post-test = 0.2630. In treatment group 2 *pre test* = 0.3602 and *post test* = 0.8054. From the results of this data, p>0.05, which means the data is distributed normally, so it is continued with the *paired t-test*.

From testing hypothesis 1 on data from treatment group 1, the results showed an increase in the functional ability of elderly people with *Lumbar* HNP conditions, using the *paired t-test* with a value of p=0.000, meaning p<0.05 (smaller than 0.05), which means Ha is accepted and Ho is rejected, which means there is an influence of SNAGS and *Mc Kenzie* actions on the functional

abilities of elderly people with *Lumbar* HNP conditions.

From testing hypothesis 2 on data from treatment group 2, the results showed an increase in the functional ability of elderly people with *Lumbar* HNP conditions, using the *paired t-test* with a value of p=0.000, meaning p<0.05 (smaller than 0.05), which means Ha is accepted and Ho is rejected, which means that there is an influence of *Core Stability & Mc Kenzie* actions on the functional abilities of elderly people with *Lumbar* HNP conditions.

The effectiveness that occurred in treatment groups 1 and 2 can be seen from the difference in mean values in the two groups. The average difference value (*mean*) is -32.55 for treatment group 1 with the average difference value (*mean*) of -37.27 for treatment group 2, which means the action of treatment group 2 (*Core Stability & Mc. Kenzie*) is more effective than the treatment group 1 (SNAGS & *Mc. Kenzie*) in increasing the functional ability of elderly people in *Lumbar* HNP conditions.

The results of this research are in line with the theory of (Norlinta *et al*., 2019) that the Mulligan SNAGS technique is a manual therapy action by determining the *facet joint* where the injury occurs by applying passive *gliding* in the *lumbar* region so that it can increase functional and muscle strength. This technique will appear placebo (comfortable) because it is a combination of *co-contraction* movements and movement control without pain.

Based on the theory of (Tantangan *et al*., 2021) which is in line with the results of this research, providing *Core Stability* training in *Lumbar* HNP actions, to activate *m. transfers abdominis* and *m. lumbar multifidus*. These muscles act as the main stabilizers in the lumbar spine which play a role in balancing between activated agonist and antagonist muscles. When balance is achieved in the contraction of the abdominal muscles and the movement of the lumbar muscles when carrying out activities, it has an impact on increasing *body awareness* and correcting good posture due to adequate control of lumbar movement.

According to the theory of (Sipayung *et al*., 2020), *McKenzie* exercises are extension movements that dominate *back exercises*. This exercise uses the principle of stabilizing muscles in the spine by strengthening and relaxing. To improve the functional abilities of elderly people with LBP due to HNP, the *Mc Kenzie* method can be used.

KESIMPULAN

Based on the research results, conclusions can be drawn, including:

1. SNAGS and Mc Kenzie's actions improve the functional abilities of elderly people with Lumbar HNP conditions.
2. *Core Stability* and *Mc Kenzie's* actions improve the functional abilities of elderly people with Lumbar HNP conditions.
3. There is a difference in the decrease in ODI scores between the two treatment groups, with the effectiveness value of treatment group 2 being more effective than treatment group 1.

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