

# Feasibility of Rehub Web Application as an Exercise Prescription Method for Office Workers with a Neck Muscle Spasm

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**Abstract:** Background: Routine home exercise will provide better benefits than just training at the health center, especially for chronic conditions. Exercise adherence and accuracy are important to achieve therapeutic goals. This study is designed to evaluate the feasibility of Rehub, a web application for personalized exercise prescription in Bahasa Indonesia. Methods: A questionnaire was asked to 10 doctors after using Rehub and 10 office workers (OW) after getting a printed prescription to evaluate Rehub's feasibility. Result: All doctors state that Rehub is easy to use and will use it. Eighty percent of doctors agree it will help them to explain, save time, and help the patient. Eighty percent of doctors agree, it has a proper description and will increase adherence. Ninety percent of doctors agree that they are satisfied and will increase health service quality. All OW agree that Rehub printed exercise (RPE) will help them to remember. Sixty percent of OW prefers to get RPE over-exercise demonstration. Eighty percent of OW agree that they are more motivated after getting RPE and will ask to get RPE. Eighty percent of OW agree that RPE is easy to understand. Conclusion: Rehub is feasible to be used as an exercise prescription option.

## 1 INTRODUCTION

Based on several studies, physical exercise is the foundation in the management of musculoskeletal medical conditions (Sihawong *et al.*, 2011; Hochberg *et al.*, 2012; Mcalindon *et al.*, 2014; Nelson *et al.*, 2014; Weber and Jevsevar, 2016). Routine physical training programs and according to medical instructions for some medical conditions are considered to be an important component in rehabilitation management programs, compared to a supervised therapy session with limited time (Fokkenrood *et al.*, 2013; Jakobsen *et al.*, 2015; Williams *et al.*, 2015; Gutiérrez-Espinoza *et al.*, 2017; Minetama *et al.*, 2019).

Prescribing physical exercises is more common using conventional methods for providing instructions for home exercise programs. Patients who need home exercise are given instructions by exemplifying some of the movements directly as well as for instructions on the frequency of exercise, the number of repetitions, sets, and length of

detention adjusted to the medical condition of each patient (Williams *et al.*, 2015). With the conventional method, it takes a long time to educate, the movements are made incorrectly and the exercise dose is not according to instructions because the patient forgets the instructions, resulting in reduced compliance.

In recent decades the use of computers has increased sharply among office workers. Computer users who spend more than 3 hours per day in front of the computer are proven to have more neck muscle spasm and develop pain (Kanchanomai *et al.*, 2012; Liyanage, Liyanage and Khan, 2014). This is related to changes in the posture of computer and mobile phone users during sitting and doing activities in front of the computer (Kanchanomai *et al.*, 2012; Liyanage, Liyanage and Khan, 2014; Nejadi *et al.*, 2015; Mingels *et al.*, 2016). In-office workers, the prevalence increases to 71% or about two out of three people will experience this complaint during life (Fejer, Kyvik, and Hartvigsen, 2006; Mehrseed Sinaki, 2016).

Various studies show that long sitting (more than 3 hours) in front of the computer adds neck flexion and head tilt, reduced head movements, shortening the distance of vision, and increasing posture deviation, resulting in forward head posture (FHP) (Kanchanomai *et al.*, 2012; Liyanage, Liyanage and Khan, 2014; Nejati *et al.*, 2015; Mingels *et al.*, 2016). FHP is a common finding in patients with migraines, tension-type headache, pain cervicogenic head, neck pain, myofascial syndrome, and temporomandibular dysfunction (Mingels *et al.*, 2016). This posture will increase the burden on the musculoskeletal system due to increased dorsal vertebral kyphosis so that the head is in front of the center gravity. If this condition is not overcome, remodeling of the structure will occur the neck and continues to become permanent deformity, ie shoulder protraction (Yoo, 2013). Combined from this condition known as the upper crossed syndrome (Bae *et al.*, 2016).

The treatment for neck pain experienced by computer users emphasizes on proper movement control and head posture to prevent improvement neck strain (Mingels *et al.*, 2016). Posture correction is done with therapeutic exercises, including strengthening (strengthening) of the muscles that are weak and stretching (stretching) tight muscles, and posture training and education (Shih *et al.*, 2017). Currently, there are various methods of exercise for the management of neck pain, both of which are practiced isometric, dynamic, or a combination of both (Somya, 2014).

For a chronic condition like neck problems in office workers, the adherence to doing an exercise has an important role to achieve the targeted goals.

There are available a lot of software applications for physical exercise prescribing methods nowadays, especially in English but no in Bahasa Indonesia. This exercise method is considered to help patients to remember instructions that have been given (Ortega-Martin *et al.*, 2019). For this reason, we try to build the first web application for personalized exercise prescription in Bahasa Indonesia, Rehub. This study is designed to evaluate the feasibility of Rehub, to office workers with neck muscle spasm.

## 2 METHOD

This study of a web application physical exercise Rehub that develop by Exinio is aimed to evaluate the feasibility of the physical exercise prescription method. The authors of this study proposed a hypothesis that printed exercise prescription can replace the conventional methods in Indonesian patients. They want to determine the doctor's experience and the patient's acceptability while using it. The progress of this study's step is illustrated in Figure 1.

We ask the doctors to prescribe neck muscle stretching exercises using Rehub. Doctors were asked to try it from the login page, patient data page, patient diagnosis, choosing exercise type, and exercise dosage (Appendix 1). After doctors exposed in a trial and patients get the printed prescription (Appendix 2). The prescription consists of static photos of movement step, movement sequence instruction, and individual notes. Doctors will answer ten questions to describe their assumption in Rehub's applicability during prescribing exercise, doctor's expectation to patient's adherence to exercise, and its impact on health service treatment quality.

Patients will answer five questions to describe their interpretation is the exercise prescription easy to understand, their preference to get a printed exercise prescription or live demonstration, their expectation in the effect of exercise adherence, and their eagerness to prescribed using Rehub. All of the questions are arranged in 5 points Likert scale using an online survey. The results are analyzed by descriptive methods.

All of the subjects are not blinded and chosen consecutively. Inclusion criteria for doctors are general practitioners, Physical Medicine and Rehabilitation (PMR) senior residents and PMR attending that competent and regularly prescribing physical exercise to patients using Bahasa Indonesia. The patient's inclusion criteria are office workers with neck muscle spasm without any prior neck injury, deformities, or surgery and able to read in Bahasa Indonesia. Subject's demographics are described in Table 1.

Table 1: Participant's characteristics.

Variables	Doctors (n=10)	Patiens (n=10)
Women, n	6	4
Level of education, n		
High school		1
Diploma		2
Bachelor's degree or above		7
Level of competency, n		
PMR resident	9	
PMR attending	1	

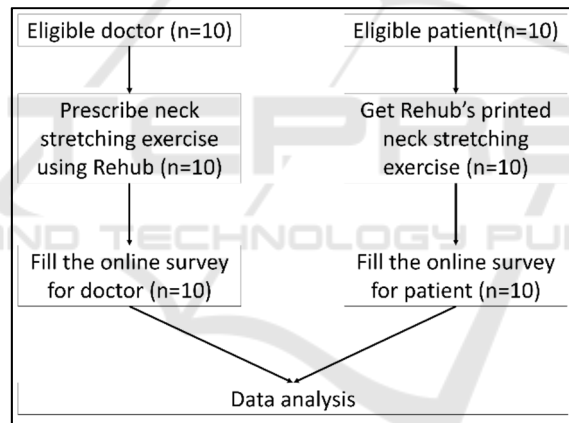


Figure 1: Steps of data collection until data analysis.

### 3 RESULTS

From the results of surveys and interpretations that have been done, both doctors and patients give a good impression for rehub application. Most doctors and patients who use Rehub feel this method can help in prescribing physical exercise and adherence.

All users state that Rehub is easy to use and they will use it in their daily practice. Eighty percent of users agree that it will help them in prescribing exercise, save time during exercise explanation, and will help the patient to understand the prescribed exercise. Eighty percent of users agree that it has a proper exercise description, and will increase patient's adherence to exercise. Ninety percent of users agree that they are satisfied with Rehub and it will increase health service quality in their daily practice. All patients agree that Rehub printed exercise prescription will help them to remember the prescribed exercise. Sixty percent of patients prefer to get Rehub printed exercise prescriptions over-exercise demonstration. Eighty percent of patients agree that they are more motivated to do exercise after getting Rehub printed exercise and will ask their doctor to get Rehub printed exercise. Eighty percent of patients agree that Rehub printed exercise is easy to understand.

### 4 DISCUSSION

A printed document as an exercise prescription for home program exercise is commonly used in several countries. Printed or written instructions were good reminders and improve patient's adherence. (Escolar-Reina *et al.*, 2010; Smaerup *et al.*, 2016; Gutiérrez-Espinoza *et al.*, 2017). Not so many medical professionals choose this kind of prescribing method because they don't know a lot of free home exercise programs and not so familiar with it. There is still no study about written or printed exercise prescription in Bahasa Indonesia.

Rehub is the first electronic, web-based application for exercise prescription in Bahasa Indonesia that used by medical professionals for their patients. We build it in a web application platform so that it can be accessed from a computer or smartphone browser. One of the shortcomings of using web applications is it needs the internet to be used.

This study could serve as a prototype exercise method for other conditions, such as muscle strengthening, muscle endurance, and

cardiorespiratory rehabilitation in Bahasa Indonesia. The Rehub web application is still in the development stage, that is why in this study limited in neck stretching exercise options and printed prescription only.

Office workers as patients are included in this study found that it is helpful to have prescribed exercises in written form and guided with movement sequence pictures. It is hoped that getting printed instructions for home exercise can help improve their adherence. From the hypothesis of this study shows that not all of the patients want to get only printed exercise prescription, but also want to be given a direct example at the first time.

With this initial study, positive expectations were obtained by both doctors and patients. Further studies are needed that assess the effectiveness in terms of accuracy of movement, exercise adherence between patients who get conventional training instructions, in printed form only, and a combination of both.

### 5 CONCLUSION

Rehub is feasible to be used as an exercise prescription option for neck muscle spasm. Further study is needed to evaluate Rehub applicability and effectiveness.

### REFERENCES

- Bae, W. S. *et al.*, 2016. The effect of middle and lower trapezius strength exercises and levator scapulae and upper trapezius stretching exercises in upper crossed syndrome, *J Phys Ther Sci.* 28(5), pp. 1636–1639. doi: 10.1589/jpts.28.1636.
- Escolar-Reina, P. *et al.*, 2010. How do care-provider and home exercise program characteristics affect patient adherence in chronic neck and back pain: A qualitative study. *BMC Health Serv Res.* 10. doi: 10.1186/1472-6963-10-60.
- Fokkenrood, H. J. *et al.*, 2013. Supervised exercise therapy versus non-supervised exercise therapy for intermittent claudication. *Cochrane Database of Syst Rev.* John Wiley & Sons, Ltd. doi: 10.1002/14651858.CD005263.pub3.
- Gutiérrez-Espinoza, H. *et al.*, 2017. Supervised physical therapy vs home exercise program for patients with distal radius fracture: A single-blind randomized clinical study. *J Hand Ther.* Elsevier Inc, 30(3), pp. 242–252. doi: 10.1016/j.jht.2017.02.001.
- Hochberg, M. C. *et al.*, 2012. American College of Rheumatology 2012 Recommendations for the Use of Nonpharmacologic and Pharmacologic Therapies in

Osteoarthritis of the Hand, Hip, and Knee. 64(4), pp. 465–474. doi: 10.1002/acr.21596.

Jakobsen, M. D. *et al.* (2015) 'Effect of workplace-versus home-based physical exercise on musculoskeletal pain among healthcare workers: A cluster randomized controlled trial. *Scand J Work Env Hea.* 41(2), pp. 153–163. doi: 10.5271/sjweh.3479.

Kanchanomai, S. *et al.* (2012). Prevalence of and factors associated with musculoskeletal symptoms in the spine attributed to computer use in undergraduate students, *Work*, 43(4), pp. 497–506. doi: 10.3233/WOR-2012-1387.

Liyanage, E., Liyanage, I. and Khan, M., 2014. Efficacy of isometric neck exercises and stretching with ergonomics over ergonomics alone in computer professionals. *IJSRP.* 4(9), pp. 1–5.

Mcalindon, T. E. *et al.*, 2014. OARSI guidelines for the non-surgical management of knee osteoarthritis. *Osteoarthr Cartilage.* 22(3), pp. 363–88. doi: 10.1016/j.joca.2014.01.003.

Mehrseid Sinaki. 2016. Issues in specific diagnoses. In Cifu, D. X, ed. *Braddom's Physical Medicine & Rehabilitation.* 5<sup>th</sup> ed. Elsevier, pp. 752–81.

Minetama, M. *et al.*, 2019. Supervised physical therapy vs. home exercise for patients with lumbar spinal stenosis: a randomized controlled trial', *Spine* . Elsevier Inc. doi: 10.1016/j.spinee.2019.04.009.

Mingels, S. *et al.*, 2016. Comparative analysis of head-tilt and forward head position during laptop use between females with postural induced headache and healthy controls. *J Bodyw Mov Ther.* 20(3), pp. 533–41. doi: 10.1016/j.jbmt.2015.11.015.

Nejati, P. *et al.*, 2015. The study of correlation between forward head posture and neck pain in Iranian office workers. *IJOMEH.* 28(2), pp. 295–303. doi: 10.13075/ijomeh.1896.00352.

Nelson, A. E. *et al.*, 2014. A systematic review of recommendations and guidelines for the management of osteoarthritis: The Chronic Osteoarthritis Management Initiative of the U . S . Bone and Joint Initiative, 43, pp. 701–712.

Ortega-Martin, M. E. *et al.*, 2019. Commercial mobile applications in the therapeutic approach to stroke: Review in main application repositories and scientific evidence, *Revista espanola de salud publica.* Spain, 93.

Somya M.V., 2014. Isometric Neck Exercises versus Dynamic Neck Exercises in Chronic Neck Pain. *IOSR-JNHS.* 3(2), pp. 32–43. doi: 10.9790/1959-03213243.

Shih, H. S. *et al.*, 2017. Effects of Kinesio taping and exercise on forward head posture. *J Back Musculoskelet Rehabil.* 30(4), pp. 725–33. doi: 10.3233/BMR-150346.

Sihawong, R. *et al.*, 2011. Exercise therapy for office workers with nonspecific neck pain: A systematic review'. *J Manipulative Physiol Ther.* National University of Health Sciences, 34(1), pp. 62–71. doi:

10.1016/j.jmpt.2010.11.005.

Smaerup, M. *et al.* , 2016. The Use of Computer-Assisted Home Exercises to Preserve Physical Function after a Vestibular Rehabilitation Program: A Randomized Controlled Study', *Rehab Res Pract.* 2016. doi: 10.1155/2016/7026317.

Weber, K. L. and Jevsevar, D. S., 2016. Case Study AAOS Clinical Practice Guideline: Surgical Management of Osteoarthritis of the Knee: Evidence-based Guideline. April. doi: 10.2106/JBJS.15.01311.

Williams, Q. I. *et al.* 2015. Physical therapy vs . internet-based exercise training ( PATH-IN ) for patients with knee osteoarthritis: study protocol of a randomized controlled trial. *BMC Musculoskelet Disord.* pp. 1–12. doi: 10.1186/s12891-015-0725-9.

Yoo, W. G., 2013. Effect of the Neck Retraction Taping (NRT) on forward head posture and the upper trapezius muscle during computer work. *J Phys Ther Sci.* 25(5), pp. 581–82. doi: 10.1589/jpts.25.581.

## APPENDIX

### Rehub prescription flow



### Rehub printed prescription

REHUB

### Neck Realignment Phase 2

Tingkat Kesulitan Sedang Durasi 27 menit

**John Doe**  
123456789

Tanggal Diagnosis: 27 Sep 2019  
Durasi Program: 1 minggu  
Jadwal Latihan: 2x per hari

M S S R K J S

Dokter:  
(Daniel Hadimartana)

**Pengantar**  
Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aliis nobis ratione iure mollitia aliquid hic beatae neque! Minima soluta cumque beatae, fugiat omnis vel voluptatem similique esse libero consequatur in!

**Fleksi lateral sendi leher**



Rekomendasi Dosis: Tahanan 10 detik Repetisi 10x Set 3x

Posisi Awal: Posisi duduk tegak tidak bersandar

**Perhatikan**

- Posisi tubuh harus tegak, bagian punggung tegak lurus seperti bersandar di tembok
- Latihan setiap sisi sesuai instruksi

**Instruksi Gerakan**


1. Letakan salah satu kaki di sudut tembok dan lengan menghadap dinding
2. Siku diposisikan sedikit lebih tinggi dari bahu, jari-jari tangan menghadap ke atas
3. Bawa kepala ke bawah ke arah lutut kiri tanpa membungkuk.
1. Perdalam peregangan dengan menarik kepala perlahan ke arah dada dan ke arah lutut sampai mencapai rasa tertarik
2. Lakukan dengan arah berlawanan secara bergantian
3. Lakukan sesuai dengan instruksi dosis latihan

**Posisi Awal** Posisi duduk tegak tidak bersandar

**Perhatikan**

- Posisi tubuh harus tegak, bagian punggung tegak lurus seperti bersandar di tembok
- Latihan setiap sisi sesuai instruksi

**Instruksi Gerakan**



1. Kaki terbuka lebar
2. Mengalihkan kedua jari tangan, letakan di bagian belakang kepala
3. Pastikan posisi tubuh tegak
4. Tundukan kepala sebisa mungkin
5. Regangkan leher ke arah bawah
6. Pertahankan regangan hingga 10 detik
7. Lakukan sesuai dengan instruksi dosis latihan

**Rotasi fleksi sendi leher**

Rekomendasi Dosis: Tahanan 10 detik Repetisi 10x Set 3x

Posisi Awal: Posisi duduk tegak tidak bersandar




**Perhatikan**

- Posisi tubuh harus tegak, bagian punggung tegak lurus seperti bersandar di tembok
- Latihan setiap sisi sesuai instruksi

**Perhatikan**

- Posisi tubuh harus tegak, bagian punggung tegak lurus seperti bersandar di tembok
- Latihan setiap sisi sesuai instruksi

**Instruksi Gerakan**







1. Kaki terbuka lebar, kencangkan punggung dan perut
1. Condongkan tubuh ke arah kiri
1. Regangkan leher dengan memeluk kepala dari samping dengan tangan kiri
2. Jangkau dan genggam bagian belakang alas kursi dengan tangan kanan
2. Kepala sedikit menoleh ke arah kanan
2. Pertahankan regangan hingga 10 detik
3. Lakukan dengan arah berlawanan secara bergantian
4. Lakukan sesuai dengan instruksi dosis latihan

**Fleksi sendi leher**

Rekomendasi Dosis: Tahanan 10 detik Repetisi 10x Set 3x

**Instruksi Gerakan**

1. Letakkan tangan di belakang secara diagonal dan putar kepala 45 derajat ke arah kiri
1. Perdalam peregangan dengan menarik kepala perlahan ke arah dada dan ke arah lutut sampai mencapai rasa tertarik
2. Bawa kepala ke bawah ke arah lutut kiri tanpa membungkuk
2. Lakukan dengan arah berlawanan secara bergantian

**Stretching pectoralis**

Rekomendasi Dosis: Tahanan 10 detik Repetisi 10x Set 3x

Posisi Awal: Berdiri tegak menghadap sudut tembok