

# **The effect of rehabilitation exercises for the use of muscle length in the manner of neuromuscular facilities (P.N.F) for people with partial rupture of the femoral rectal muscle of the runners indicating the motor range of the knee and hip joints**

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**Keywords:** rehabilitation exercises, neuromuscular facilities(P.N.F), rectal muscle, motor range.

The importance of research came through the development of rehabilitation exercises in this way to qualify the injury of the anterior rectal muscle to be a modest practical rehabilitation method in the hands of trainers and sports workers, and the study aimed to prepare rehabilitation exercises especially using muscle length in the manner of neuromuscular facilities(P.N.F), as well as to recognize the impact of special exercises in the way of neuromuscular facilities For sensory receptors (P.N.F) in the rehabilitation of the injured part of the research sample, the researcher used the experimental method to suit the nature of the problem by designing a single group to suit the nature of the problem to be solved, the research sample included a number of runners with partial rupture of the rectal femoral muscle number (6) runners of short axles formed (100%) From the research community, the clinical diagnostic examination of the injury was carried out by a specialist doctor, and the radiography of the research sample was carried out and under the supervision of a specialized medical team of the front femoral muscle from the competent staff at Baquba Educational Hospital after clarifying the idea of research and selecting the sample, and after it was found that there was a partial rupture in one of the muscles The femoral quadriceps of the research sample members, the research procedures included conducting reconnaissance test procedures and pre- and post- tests, and the rehabilitation exercises of the femur rectal muscle were applied to athletes with partial rupture and the researcher applied these exercises for (6) weeks after one to two weeks of taking Treatment by the members of the sample, and the rehabilitation program was launched the first unit on Saturday, 21/11/2020 (3:00 p.m. and the program ended on Wednesday( 30/12/2020) at Diyala Sports Club The total number (18) units and time (35-40) minutes per rehabilitation unit, the researchers concluded that the application of length exercises in a way (PNF) has an effect in increasing the motor range of the knee and hip joint with its full motor range in movements (tide and bend) The researchers recommend emphasizing the importance of relying on pNF exercises used by the researcher, due to their effectiveness in the rehabilitation of anterior femoral muscle injuries for the research sample, and emphasizing the use of sensory receptive activation exercises (PNF) within various sports training programs.

## **1.Introduction:**

Despite these great efforts to prevent the injury of the athlete, but with the many motives and the many occurrence of sports injuries, which drew the attention of specialists to look carefully at rehabilitation and its role and importance in reducing the period of injury and the speed of return of the player to the stadiums, as rehabilitation and therapeutic exercises are sciences that the human sought to develop as the human became concerned in research in many From its branches and sections to find the best ways to harness it in the service of humanity, rehabilitation is a process that will maintain the restoration of the body to its natural and vital state and strength after emergency exposure using therapeutic exercises, studies and research indicate that when starting rehabilitation early, healing is more rapid and early return to the normal state of the injured body.

Athletics is one of the main events in athletics, which is represented by high achievements through record-setting and the more competition increases the likelihood of injury to many runners as a result of training and repeated loads and the length of the competition for this muscle as well as the surrounding conditions that help the injury.

Sports rehabilitation is particularly important in the field of rehabilitation to prepare the injured player for his specialized activities and return to the stadiums after restoring the basic functions of his body and motor abilities by activity, motor rehabilitation is the process of restoring the anatomical

form and the functional performance of the injured member to such a condition before injury using Various motor therapy methods with the aim of restoring the athlete to his activity after injury and protecting the affected area from recurrence of injury, and the process of motor rehabilitation depends on the performance of physical exercises of various kinds in addition to the use and use of equipment and tools for the purpose of completing treatment and rehabilitation processes (Medhat Qasim:16:2018).

Rehabilitation is defined as: "A set of programs and procedures with a preventive or therapeutic orientation, provided to the individual to maintain his or her normal anatomically and functionally, or as close to it as possible", and that it is the process of rehabilitating human adaptation to the environment, or preparing it for life by undergoing one or more of the required rehabilitation programs (Hanafi and others:14:2008).

PNF means (characteristics of facilitating neuromuscular receptors) as a way to stimulate or facilitate the mechanics of neuromuscular action by stimulating receptors, as receptors are sensory receptors found in muscles, tendons and joints to transmit information or signals about the physical condition as well as the development of muscle structure and joints, and receptors give basic information for simple harmonic movements, and the position of the body

PNF extensions are the method taken from physical therapy for infected patients, and PNF for (activation of sensory receptors or neuromuscular compatibility) are newly used exercises and advanced exercises to train and improve flexibility, in which both lengthening and constriction of muscle groups involved in exercise are involved, and their prevalence increased in the 1980s, including the use of successive isometric contractions and muscle relaxation (IAAF:12:2010).

It is one of the most famous concepts of physiotherapy found (1940) from the last century by Dr. Kabat and Margaret and continued to expand and develop the techniques and procedures of this type of treatment, after which Dorothy Voss organized into the team in 1953, and Margaret and Dorothy wrote the first book on PNF published in 1956. Susan S. Adler 2008, PVII

By informing the researcher about the therapeutic rehabilitation centers, the researcher found that there are many ways and methods to rehabilitate different injuries, and that there is great importance in reducing the time and effort of the injured and the speed of healing through the use of the method of muscle lengthening in the way of neuromuscular facilities (P.N.F).

The researcher believes that this injury comes as a result of the recurrence of contraction and relaxation in the groin area, which is the main place for the transfer of movement and strength to the foot and ankle and explosive movements to overcome resistances that make this muscle most vulnerable to injury that causes some ruptures due to contraction and continuous severe pregnancy on the muscle as well as the use of training stress above the level of muscle tolerance, which forced the researcher to develop a modest solution to this problem, hence the importance of research through the development of rehabilitation exercises in this way to rehabilitate the injury of the straight muscle Front femoral to be a modest practical rehabilitation method in the hands of coaches and sports workers.

The study aims to prepare special rehabilitation exercises for the use of muscle length in the manner of neuromuscular facilities (P.N.F), as well as to identify the effect of special exercises in the way of neuromuscular facilities for sensory receptors (P.N.F) in the rehabilitation of the affected part of the research sample

The researchers also assume that there are statistically significant differences in the level (motor range, strength level and degree of pain) between pre- and post- tests and in favor of post- tests of the research sample.

## **2 Research approach and field action:**

1.2. Research Approach: The researcher used the experimental method to match the nature of the problem by designing the same group to suit the nature of the problem to be solved.

2.2. Research sample: The research sample included a number of runners with partial rupture of the rectal femoral muscle (6) who formed 100% of the runners. From the research community, the clinical diagnostic examination of the injury was carried out by a specialist doctor, and the radiography of the research sample was carried out and under the supervision of a specialized medical team of the anterior femoral muscle from the competent staff at Baquba Educational Hospital after clarifying the idea of research and sample selection, and after the partial rupture was found in one of the muscles of the femoral quadriceps of the members of the research sample.

The research sample was subjected after the use of prescription drugs and according to the prescriptions of the therapist and specialist to the rehabilitation exercises of the researcher, and the reason for the researcher's choice of these games because of the large incidence and recurrence of this muscle, especially in runners, and the injured frequented physical therapy centers and private clinics,

and the degree of injury was determined and the location and date of the injury was determined by the doctor.

Table (1)  
Shows the number of injured and their clubs

to	Type of game	Infected	Infected muscle side	
			Right	Left
1	Diyala Club	3	2	1
2	Al , Shahid Arkan Club	2	2	-
3	Al , Khalis Club	1	1	-
Total		6	5	1

The researcher found the normal state of the search sample on the one hand: height, age, and mass, using the twisting factor, indicating ( $\pm 3$ ) homogeneity among the sample members as shown in table 1.

Table (2)  
The description of the research sample shows (age, height, weight)

to	Variables	Unit of measurement	arithmetic medium	Broker	Standard deviation	Twisting coefficient
1	lifetime	year	22.500	22.500	1.516	0.774
2	Weight	he murmured	78.833	79.00	3.250	0.537
3	Length	poison	178.33	178.00	3.141	0.469
4	Training age	year	4.333	4.500	0.816	0.857-

**3.2. Devices and tools used in research:**

Electro Nilongitude and mass measurement device, number (1), Delltype laptop calculator, (1), laser discs(CD), number (6), manual timer type(Casio), number (4) Metric tape, number (1), 10 m length tissue measurement, rubber bars, power sensor (EK3200),mark, junometer, radiology and resonance.

**4.2. Tests used in the search:**

1.4.2. Motor range test for knee and hipjoint:

- The purpose of thetest: measure the kinetic range during the forward and backward tide.
- Toolsused: junometer to measure angles, check bed, paper and pen.
- Perfomancedescription:
  - For measuring the motor range of the hip joint, it is measured by sitting long on the examination bed and then bending the uninfected knee, extending the injured leg and marking three first point links on the knee joint of the brutal side, and the second point on the shoulder joint, The third point is the hip joint and coloring it in red and connecting it with lines between them in order to determine the angles across the gonometer where the injured bend the hip joint forward top with bending the knee joint and attracting the knee joint towards the chest to the last point the injured can reach and then extend the hip joint and reach the parallel position of the earth, as the angle is read Achieved at the full tide of the hip joint in the degree and during bending and recording, the measurement is re-measured three times and the average reading is taken three times, knowing that the full motor range of the hip joint in the movement of the tide is (0-180) degrees (Proof:79:2014).
  - As for the knee joint measured by the motor range of the knee joint is measured during the tide and bending through the position of lying on the back or sitting, the player extends the injured man fully from the knee joint from the folding position, after the laboratory places and installs the gonometer on the brutal bite of the femur taking into account that the fixed arm of the device along the femur and moving arm along the legs bones (NancyBerryman Reese and William, (2002, P304 D Bandy).

- As for measuring the motor range of a joint during bending, the motor range of the joint is measured from the position of lying on the back or sitting, the player completely bends the injured man from the knee joint from the numerator position, after the laboratory places and installs the goniometer on the brutal bite of the femur, taking into account that the fixed arm of the device is along the thigh bone and moving arm along the leg bones.
- The angle achieved in the full tide of the knee joint is read by degree and recorded, re-measured three times and the average of the three readings is taken, knowing that the full motor range of the knee joint in the movement of the tide is (0-180)degrees.

### **5. 2. Exploratory experiments:**

The researchers conducted the first reconnaissance experiment on the same research sample of athletes with partial rupture of the anterior femoral rectal muscle on Sunday, 15/11/2020, the following purpose:

- 1- Check the accuracy and safety of the devices and tools used.
- 2- How appropriate and appropriate the measurements for the sample, and find out the difficulties faced by the sample and the researcher during the application.
- 3- Calculate how long different measurements take when applied to take advantage of this when conducting the main search experience.
- 4- Train assistants on how to apply tests and how to score grades.
- 5- Take into account the safety of the injured when performing measurements.
- 6- Know the constraints and errors that accompany search procedures.
- 7- You know the time allocated for each test.

The researchers conducted the second reconnaissance experiment on Tuesday, 17 November 2020 on Diyala Sports Club by conducting qualifying exercises on a sample of three players, and the purpose of the experiment was: to identify the validity and vocabulary of qualifying exercises and the devices used in them, and the researcher was able to notice some of the negatives in the exercises, including the difficulty of some of them on the sample as well as some mechanical aspects of the exercises does not fit the sample, and reached the following:

- Review and formulate exercises in a sample-friendly manner.
- Suggested exercises and tools can be applied to research sample members.
- The authority of the auxiliary staff and their introduction to the mechanism of action and the distribution of tasks among them.
- Determine the time taken for the rehabilitation training unit and determine inter-exercise breaks.

### **6.2. Pre- Tests:**

After completing all the research and preparation requirements for the application of therapeutic exercises in a manner(PNF)and for the purpose of identifying the status of the research sample before the introduction of the independent research variable, pre- tests were conducted for the search sample dated (18-19/11/2020) and on all members of the research sample.

### **7.2. Rehabilitation exercises:**

The rehabilitation curriculum prepared by the researcher after referring to the theoretical references and seeing many sources and references Arab and foreign and previous studies for rehabilitation and taking the opinion of a group of experts and specialists, and before the application of the program there are several steps to be followed, namely the examination of the injured by the competent doctor, in order to determine the degree of muscle injury and then the program for treatment and the registration of this information in the form for the diagnosis of the patient, which is a patient form reviewed by the physiotherapy center at Diyala General Hospital.

The weight and length of the patient's program is then measured and recorded by the patient's form, as this form is filled out by the researcher.

In order to achieve the goals, the researcher developed a series of rehabilitation exercises for the thigh straight muscle of athletes with partial rupture and the researcher applied these exercises for (6) weeks after one to two weeks after taking treatment by the members of the sample, and the rehabilitation program was launched the first unit on Saturday ( 21/ 11/2020) at 3 p.m. and the program ended on Wednesday (30/12/2020) at Diyala Sports Club total total The researcher relied on a group of experts and specialists in the field of training and sports rehabilitation, as well as the experience of Mr. Supervisor, taking into account the scientific foundations in preparing these exercises in their final form for the purpose of applying them to the research sample, as the researcher prepared these exercises according to the following. :

- Take into account the principle of diversity in exercise performance within the rehabilitation unit so that sample members do not get bored.
- Following the principle of gradient is easy to difficult and simple to composite.
- Take into account the principle of repetition in exercise.
- Use of utilities in rehabilitation units.
- The curriculum has been implemented with three rehabilitation units per week.
- The curriculum is implemented in collaboration with the competent doctor to consult him in the event of any complications preventing the application of the curriculum.
- The rehabilitation curriculum was implemented by the assistant team and under the direct supervision of the researcher.
- Guide research sample members not to expose the affected area to any external stress or trauma to avoid complications.
- Hold Relax has been used and is implemented as follows:
  - Positive preliminary lengthening performance for (10) seconds.
  - Perform consistent muscle action against the force imposed by the colleague while the muscle group is in a lengthy position for (6) seconds.
  - Relax the muscle group.

8.2. Post- tests:

The researchers conducted the post- tests of the research sample on Sunday and Monday (3-4/1/2021), after the expiry of the qualifying curriculum, and in the same pre- test method the researcher was keen to prepare the post- tests in terms of spatial and temporal conditions of pre- testing.

9.2. Statistical means: Researchers used the statistical bag (SSPS) to process the results.

3.View, analyze and discuss the results.

1.3. Presentation and analysis of pre- and post- results in motor range tests:-

Table(4)

The computational circles and standard deviations of variables show the motor range of the knee and hip joint.

Variables	Unit of measurement	Pre- testing		Post- testing	
		A	STD	A	STD
The motor range of the hip by bending	degree	78.3333	6.0553	59.666	4.1793
The motor range of the hip with the extension	degree	172.166	2.3166	178.833	1.6020
The motor range of the knee with bending	degree	63.000	5.0990	46.500	5.2057
The motor range of the knee in the extended	degree	164.833	4.3550	177.1667	2.3166

Table(5)

It shows the arithmetic circles, the deviation of differences, the value of (t) and the error ratio between pre- and post- tests.

Physical variables	QP	P	Value (t)	Error rate	Moral significance
The motor range of the hip by bending	18.6666	6.1210	7.470	.001	Spiritual

The motor range of the hip with the extension	6.6666	2.5819	6.325	.001	Spiritual
The motor range of the knee with bending	16.5000	7.7136	5.240	.003	Spiritual
The motor range of the knee in the extended	12.3333	4.1311	7.313	.001	Spiritual

Table () above calculated (t) values of the research sample and below the level of error below (0.05), shows that there are moral differences between pre- and post- tests and in the interest of post-tests, in the variables of the motor range of the knee and hip joint, and it is clear that the development of the motor range and this range was not achieved if the exercises developed and improved muscle susceptibility at the level of this range The researcher attributes this to the improvement in muscle lengthening as a result of the rehabilitation program, which included exercises in a way that facilitates the functioning of neuromuscular receptors(PNF),as the extremability of the muscle means the possibility of movement of thejoint more freely, and that by developing muscle susceptibility to elongation will increase the motor range of the joint down to the limits of the normal range specified due to the shape, type and function of the joint. Most scientific studies assess the positive effect of muscle lengthening in increasing the motor range ( , 2011, P. 255-262Hassan Daneshmandi, Ahmad Ebrahimi (Atari.

The results showed improved motor range tests as exercises developed muscle elasticity and elasticity, which led to increased motor range and all directions, as indicated by (Talha Hossam, 1997) that "the exercise of flexibility exercises achieves muscle length and increase the characteristic of rubber ligaments and muscles together and thus expand the motor range" (Hossam al-Din and others:246:1997).

Most studies prove that there is a relationship between the movement of the hip joint, knee and femoral muscle so that the level of measurement of the healing and rehabilitation of the muscle is done by examining the motor range of the knee and hip, the joint improves its movement with the patches of improvement and healing of the muscles responsible for its movement and determines its range appears through the condition of pain that falls on the biting The muscle responsible for its movement or related to it, the motor extent of the joint is a mirror that reflects the healing of the muscle and is determined by the strength of the existing muscle groups and to develop its range must be developed or rehabilitated in case of injury (Ramadan and Jaber:528:2010).

In addition, the researcher believes that the development of the motor range means the development of the level of decentralized constriction greater than the level of development of the central constriction and that the level of muscle rubber became more and the muscle became in a position to move in different and large ranges, which is one of the indicators of rehabilitation, and the results indicated a gradual increase in the motor range during the weeks of the rehabilitation curriculum and towards reaching the full motor range of the knee and hip joint bend and tide.

PNFexercises areessential in rehabilitation programs because of their importance, andvictoria etal, 2013,13,is a valuable part ofall rehabilitation programs.

The choice to usePNFis a step in theright direction to rehabilitate sports injuries and increase the range of motor, as Jamal Sabri, 2018,224,states thatmuscle lengthening exercises effectively contribute to the speed of recovery from injury in the rehabilitation curriculum if the therapist uses the right type of prolongation during the rehabilitation process.

Natural and pathological movements in the joints are the key to functional anatomy and the basic basis for describing useful therapeutic exercises with sufficient time to end the treatment program limits the extent of joint movement is an indicator of the injury of the muscle on which it works or affects, and the increased motor range means that muscle susceptibility has become greater elasticity. that.

We find that there is a remarkable development in the measurement of the test (tide) and the researcher noted the similarity of the development of the motor field such as the movements (bending

and tide) which comes from the biomechanical similarity to the performance of the two movements and convergence rehabilitation exercises affecting the development of these two movements. Due to the effect of the proposed following approach and to the therapeutic exercises used that have a clear effect, they are characterized by ((tissue, muscle and ligament susceptibility to proper stretching with joint susceptibility to full movement and control of the body) (Blocked:90:1989).

Flexibility is the ability of related muscles and tendons and joint-bound ligaments to stretch, allowing them to perform their movement in full or wide range, and flexibility has a significant contribution to reducing the incidence of sports injuries and muscle tears and in preventive work in general (Al-Jubouri and Kaplan:240:2012).

#### **4.Finale:**

In light of the findings obtained by the researchers that the application of PNF exercises has an effect in increasing the motor range of the knee and hip joint with full motor range in movements (tide and bending), the researchers recommend emphasizing the importance of relying on PNF exercises used by the researcher, due to its effectiveness in the rehabilitation of anterior rectal femoral injuries of the research sample, and emphasizing the use of sensory receptor activation exercises (PNF) within various sports training programs.

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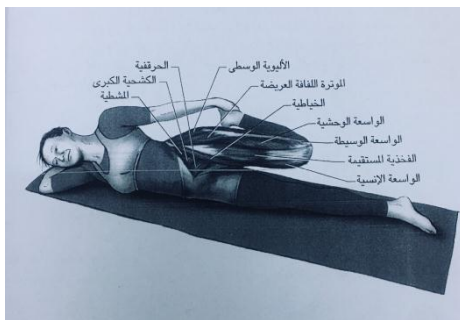
Supplement (1)

PNF exercises used in muscle rehabilitation



Exercise #1:

Lie flat on your back facing the entrance of the chamber door with the hips in front of the frame of the door, lift the right leg and support it on the frame of the door, keep the right knee straight and the left leg flat on the ground, put your palms on the floor on both sides of the mechanisms, while keeping the right knee straight, use your hands to move the two mechanisms slowly through the door entrance and stability for (6-10th) and then relax (10-15 tha).



Exercise #2:

Lie on the right side of your body and then bend the left knee and make your left foot heel reach a distance (10-15cm) of the two mechanisms, hold the left ankle with provisions and pull the foot back until you reach the athletic, but do not make your left heel reach on its own to the two mechanisms at once without using your hand, push the hip forward at the same time and steady for (6-10th) and then relax (10-15 tha).



Exercise #3: -

Stand comfortably with a chair on the side of the body in order to maintain balance while bending the left man's knee, with the heel lifted in the direction of the seat, keep the left man or foot steady using the left hand while keeping the lower back area straight with the heel steering in the direction of the middle of the seat and not out of the thigh, from this initial position, try to extend the left man against your self-resistance, with the work of fixed contraction of the thigh muscles for a period (6-10th) and then relax (10-15 tha).

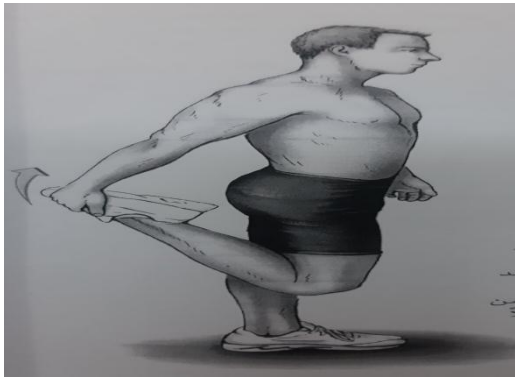


Exercise #4: -

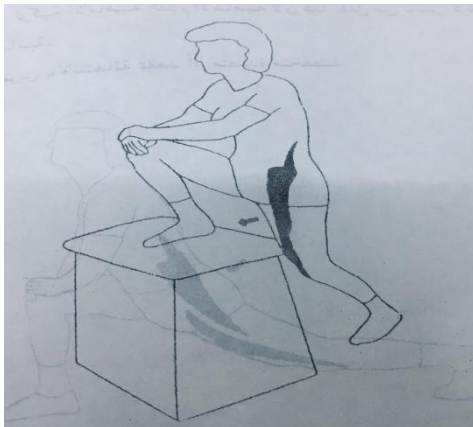
Stand up one of the two men on a low seat with the bond enough hands on the man's raised knee, bend the other man's knee a little, push the lower man's thigh to the imam's side as far as possible gradually with the anchor on the lower man's comb, with a steady contraction work for 6-10th and then relax (10-15 tha).



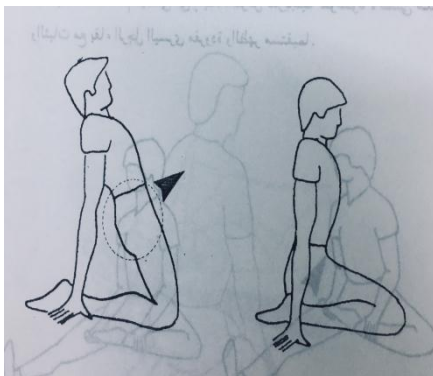
**Exercise #5:**



Stand up and bend your back towards a table to be below the level of your hips and then make your body weight weigh on the left leg and bend the knee a little, bend the right knee and support the right ankle to the supporting surface behind you, put both hands on the back support surface at a distance (15-30) behind the two mechanisms, then Move the torso back slowly until the right heel touches the two mechanisms, make sure that the ankle and knee are in a comfortable position, push the hips forward and at the same time the back arch to bend the shoulders towards the two mechanisms, with the installation work for (6-10th) and then relax (10-15 tha).



Exercise No. 6: - Stand moderate with the body weight weighing on the left leg, keep the left foot completely forward and the knee almost straight. To help keep the balance, bend your right hand to a wall in front of you, bend the right knee, hold the right foot or right ankle with provisions and pull the right foot heel back and slightly higher for a distance (10-15 cm) from the two mechanisms and at the same time, push the hips forward, with the installation work for (6-10th) and then relax (10-15 tha).



**Exercise #7: -**

Make a step forward with your left leg and bend your knee at a 90-degree angle. Put your hands on the left knee to maintain balance, move the hips forward, push the left knee in front of the left ankle level and bend this ankle towards the back of the foot, with the installation work for (6-10th) and then relax (10-15 tha).



**Exercise #8: -**

Sit the body, anchoring the shoulders of the arms on the ground next to the body, lifting the seat and pelvis from the feet, then pushing the pelvis forward and upward gradually until it remains straight without bending, firming in this position, with the installation work for (6-10th) and then relaxing (10-15 tha).

Supplement (4)

Rehabilitation approach using pNFexercises for the first month

Week	Number of units	Exercises used	Iteration	Totals	Comfort between repetitions	Rest among totals
First	1	1	2K	6	2	60 Tha
	2	2				
	3	3				
	4	4				
Second	1	5	2K	6	2	60 Tha
	2	6				
	3	7				
		8				
Third	1	1	3K	10	2	60 Tha
	2	2				
	3	8				
		7				
Fourth	1	3	3K	10	2	90 Tha
	2	4				
	3	5				
		6				