DEVELOPMENT OF HOCKEY GAME-BASED RECOVERY MODEL

Andi Miftahul Jannah[1], BM Wara Kushartanti[2], Cerika Rismayanthi[2], Abdul Rahman[3], Erick Burhaein[4] & Diajeng Tyas Pinru Phytanza[5]

[1]Doctoral of Sports Science, Faculty of Sports Science, Universitas Negeri Yogyakarta, Indonesia
[2]Department of Sports Science, Faculty of Sports Science, Universitas Negeri Yogyakarta, Indonesia
[3]Faculty of Sports Science, Universitas Negeri Makassar, Indonesia
[4]Department of Sports Education, Faculty of Teacher Training and Education, Universitas Ma'arif Nahdlatul Ulama Kebumen, Indonesia
[5]Department of Special Education, Faculty of Education, Universitas Negeri Yogyakarta, Indonesia

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Abstract
This research aims to create a recovery model in PON hockey athletes in South Sulawesi. It is hoped that it can be used by coaches to make it easier in the recovery process after training and competing, especially in hockey games. The method used in this study is a method of development of Borg & Gall that has been simplified according to the researcher's determination. Development of hockey game-based recovery models, starting from: (1) needs analysis, (2) Initial product (draft recovery model), (3) Expert validation (hockey game expert and exercise physiologist) and revision: feasibility test (small and large scale), revision, and (4) evectivity test, (5) final product (book that has been ready to be disseminated). The feasibility trial was conducted on 10 hockey athletes at hockey clubs in south Sulawesi. Feasibility tests (large scale) and effectiveness tests were conducted on 20 PON hockey athletes in South Sulawesi. The data collection instrument uses questionnaires, observation/interview guidelines, pulse measurements (DN), breath frequency (FN), blood pressure (TD), and fatigue assessment scale (FAS) measurement questionnaires for athletes. Data analysis techniques are qualitative and quantitative descriptive. Test effectiveness using a different test (Wilcoxon Signed Ranks Test). This research resulted in a recovery model based on hockey games that are feasible and both for use after practice and after competing on hockey players. The recovery model is packaged in the form of a guidebook. The hockey game-based recovery model was validated by two experts and was declared fit for use. The expert assessment of hockey games on the hockey game-based recovery model is 73%, falls into the decent category. The assessment of exercise physiologists on the hockey game-based recovery model of 75% falls into the category of feasible. The results of the effectiveness test using a different test (Wilcoxon Signed Ranks Test) obtained a value of 0.000 meaning a significance value (P< 0.005). The hockey game-based recovery model developed proved effective against fatigue recovery with indicators: decreased pulse rate (DN) with an effectiveness of 27.91%, breath frequency (FN) with an effectiveness of 16.08%, and Fatigue Assessment Scale (FAS) with 23.97% efetivity, as well as normalizing blood pressure (TD) cystol with an effectiveness of 9.35% and diastole with an effectiveness of 11.31%.

Key words: *athletes, game, hockey, recovery.*

Introduction

Fatigue is a physiological phenomenon, a process of decreasing tolerance to physical work. The cause depends on the characteristics of the work performed. Exercise, lack of rest, excessive activity, and daily stress can lead to fatigue (Burhaein et al., 2022; Phytanza, Burhaein, & Pavlovic, 2021; P. Purwanto, Lumintuarso, et al., 2021). Fatigue can occur due to the accumulation of exercise load stimulus that is given continuously in volume and high intensity (Burhaein, Ibrahim, et al., 2020; Phytanza & Burhaein, 2020). There are several factors that can cause fatigue so that resources are depleted, disruption of the balance of income and expenditure of fluids in the body, disruption of electrolyte balance in the body, the stockpiling of lactic acid in the body, blood circulation is hampered, and reduced oxygen intake in the body (Burhaein, Tarigan, Budiana, Hendrayana, Phytanza, Demirci, et al., 2021; Mumpuniarti et al., 2021; Phytanza, Burhaein, & Pavlovic, 2021). In the era of the development of a very cultured sport both in Indonesia and the international world, one of them is the sport of hockey.

Hockey is one of the sports that are included in the sport that is always competed in the highest multi-event event in the world from the Olympic Games, Asian Games, SEA Games, and other championships including the National Sports Week (PON) (Putra et al., 2021; Saputri & Suharjana, 2020; Sibarani & Manurung, 2021). In the sport of hockey is a sport that requires a lot of energy, so athletes are required to have a good level of physical condition for optimal achievement. This statement is supported by the opinions of Lawanis (2019) based on the results of hockey athletes' speed tests from 20 athletes in the average aerobic endurance results owned by hockey athletes categorized as less at all. Hockey is a sport that requires an energy system adenosine triphosphate-phosphor creatin (ATP-PC), and an

anaerobic energy system. The aerobic process is one way to eliminate fatigue substances, because during the aerobic process blood flow can be flowed to the brain and heart, the process of respiration runs smoothly which causes oxygen to enter the body so that it quickly forms energy again (Burhaein, Phytanza, et al., 2020; Powers & Edward, 2007). This statement is supported by opinions Lawanis (2019) based on the results of hockey athletes speed tests from 20 athletes in the average aerobic endurance results owned by hockey athletes categorized as less at all. Hockey is a sport that requires an energy system adenosine triposphate-phospor creatin (ATP-PC), and an aerobic energy system (Demirci & Phytanza, 2021; Saputri & Suharjana, 2020; Sulistiantoro & Setyawan, 2021). The aerobic process is one way to eliminate fatigue substances, because during the aerobic process blood flow can be flowed to the brain and heart McDermott, et al. (2017), the process of respiration runs smoothly which causes oxygen to enter the body so that it quickly forms energy again (Burhaein, Phytanza, et al., 2020; Burhaein, Tarigan, et al., 2020; Giriwijoyo & Sidik, 2012). In addition to requiring aerobic endurance, hockey also requires high-speed anaerobic endurance involving acceleration, deceleration, and sudden cessation and power (Bompa & Buzzichelli, 2019; P. Purwanto, Nopembri, et al., 2021; S. Purwanto & Burhaein, 2021).

Thus athletes are required to have physical condition, especially good aerobic capacity with a rapid recovery process in one match (Chaabène et al., 2012; Sutopo & Misno, 2021; Widiyono & Mudiono, 2021). In training let alone the match (tournament) the recovery factor plays a very important role. Optimization of the type of recovery is important to do considering the quality of good recovery can reduce fatigue both objectively and subjectively, and can reduce injuries (Azizah & Sudarto, 2021; Hartono et al., 2012; Widodo & Najibuzzamzam, 2021). Based on interviews conducted by researchers in August on South Sulawesi hockey athletes often follow matches or tournaments complaining of fatigue that is very meaningful and lack of knowledge about a good and fast recovery model, thus making the performance of south Sulawesi hockey athletes decrease. Recovery is the process of recovering muscles and other body parts of the condition before exercise.

According to the basis of the theory that active recovery is a form of rest that means athletes do not stay silent, but still do physical activity with very light intensity (20% DNM) to (50% DNM) such as jogging and walking, while passive recovery is recovery that is done by stopping activities can be done by sitting, lying down, and standing (Catur & Mujiriah, 2021; Lesmana et al., 2017; Widodo & Zainul, 2021).

The purpose of recovery is to adapt the physiological condition of the athlete to stress during training and competition. This is explained by (McGuigan, 2017) in the training period, recovery is needed to achieve rapid compensation of exercise load under normal conditions (homeostasis) by stabilizing the function of tissues in the body and strengthening the tissues so that they can reach the peak of performance progressively. Recovery quality can be monitored using several physiological and biochemical parameters (Halevi, Y., Carpanzano, E., & Montalbano, 2014; Irawan & Prayoto, 2021; Pramantik, 2021)

The game of hockey is conducted for 70 minutes divided into 2 (two) innings, each half for 35 minutes with a break between the first and second half (I and II) for 5-10 minutes. So that the athlete is not ready to continue the match with optimal conditions because the fatigue has not fully recovered, so the expected results are less achieved with the sign of frequent conceding (Burhaein, Tarigan, Budiana, Hendrayana, Phytanza, Lourenço, et al., 2021; Nanda et al., 2021; Phytanza, Mumpuniarti, et al., 2021). In the match period, effective recovery greatly supports the performance of athletes in each round of the match, therefore a kind of recovery model is needed to minimize the event.

Based on the results of interviews and observations above it can be concluded that the number of athletes who experience fatigue due to the recovery model does not reach the stage of hockey training. This is due to several factors including (1) athletes do not know about the recovery model, (2) athletes do not have time to recover because of their very limited training time, (3) athletes need help, but no one understands the recovery model. Players who experience fatigue, should not be forced to join the team but must follow a recovery model program in the form of hockey games that are carried out directly in the field of hockey.

It is on this basis that researchers want to research and develop an exercise recovery model on the "Hockey Game-based Recovery Model Development". This model is a recovery packaged in the form of training therapy, basic techniques, and self-massage that uses hockey game aids (stick and ball) for hockey athletes who experience fatigue after training or competing so that athletes can recover on the field. This recovery model will be developed with movements that are safe, convenient, easy, interesting, and inexpensive because it is based on hockey games and uses exercise tools on hockey.

This recovery model is packaged in the form of a guidebook in making it easier for athletes to understand every move. Through this product hockey players can know and understand recovery after training and post-match so that it is expected to reduce the risk of fatigue.

Methods

Research Design

This type of research is research and development (R&D) which is the type of research used to produce a particular product and test the effectiveness of that product. According to (Gall et al., 2003), research and development methods are research methods used to produce a particular product and test the effectiveness of the product.

This research ignores the steps written by Gall et al. (2003). Furthermore, these steps are simplified according to the needs of the researcher. This simplification includes 5 stages, namely:

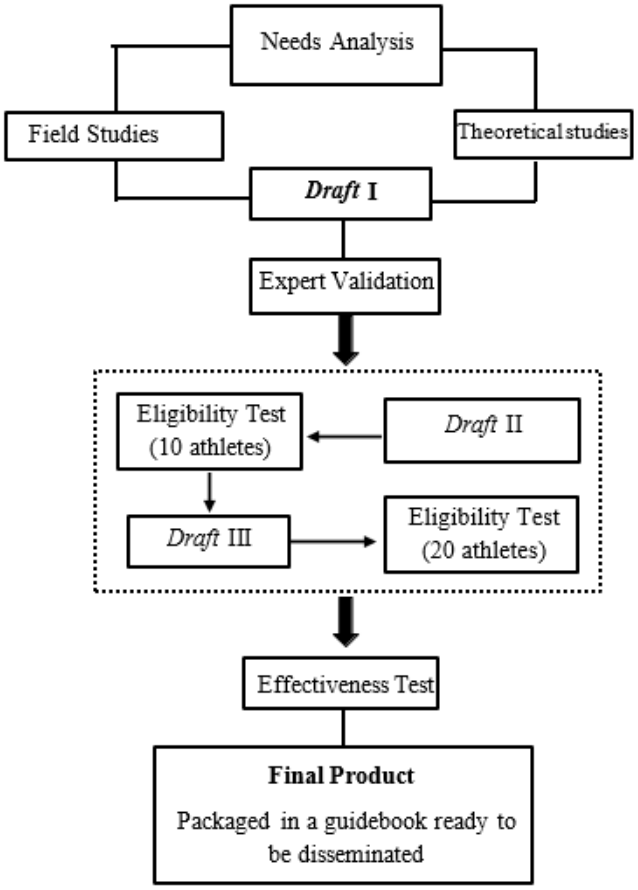

Figure 1. Steps to use simplified research and development methods
Source: Gall et al. (2003) modified by authors

Participants

The participants of this study were 40 National Sports Week (PON) hockey athletes. The total number of participants was then divided into three stages. The first phase, the feasibility trial (small scale) was conducted on 10 hockey athletes in hockey clubs in South Sulawesi, Indonesia. The second phase, the feasibility test (large scale) was conducted on 20 PON hockey athletes in South Sulawesi. The third stage, the effectiveness test was conducted on 20 PON hockey athletes in South Sulawesi (large scale) using experimental methods with control group pretest-posttest design, but on the same day.

Instrument and Procedures

To get a response from respondents, a quality research instrument is needed. The instruments used to dig up data in this study are questionnaires, observation guides/interviews, and measurement tests. Can be seen in table 1.

Table 1. Techniques and Instrument data collection.

No	Type of Test	Technique	Instruments	Data Scale
1.	Due diligence	Questionnaire	Questionnaire for material experts (exercise therapists/ health experts) about hockey game-based recovery models	Ordinal
			Questionnaires for hockey athletes	Ordinal
		Observation Guide/Interview	Observation Guide/ Interview on recovery models tested in the field.	Nominal
2.	Effectiveness Test	Measurement test	Pulse (DN)	Ratio
			Frequency of One Breath (FN)	Ratio
			Blood Pressure (TD)	Ratio
		Questionnaire	Fatigue Assessment Scale (FAS) fatigue measurement scale that has been tested to its validity and reliability	Ordinal

Source: Data Primer

Data Analysis

The analysis of this research data is divided into two types. Both types are qualitative data and quantitative data. Qualitative data, in this study is data obtained through validation from material experts and hockey players. Data obtained from experts to find out whether the data is valid or not, and expert input is used for product revision so that the data obtained is used to develop a recovery model product based on basic hockey techniques.

Quantitative data, analyzed with prerequisite tests (data normality tests), different tests, and feasibility tests. The results of the calculation of the next data are made in the form of percentages multiplied by 100%. After obtaining a percentage with the formula, then the feasibility of the recovery model. According to Arikunto (2009: 44) the division of eligibility categories is five. The maximum expected value is 100% and at least 0%.

Table 2. Eligibility Percentage Category.

No	Score in Percentages	Eligibility Category
1	< 21%	Very unworthy
2	21 – 40%	Unworthy
3	41 – 60%	Decent enough
4	61 – 80%	Proper
5	81 – 100%	Very worthy

Results and Discussions

Results

The results of research and discussion will be presented sequentially as follows: (a) needs analysis consisting of field studies and theoretical studies (b) draft I (Initial products) Hockey game-based recovery model (c) expert validation (d) Validation stage is implemented to obtain initial product data in the form of hockey game-based recovery model equipped with usage manuals and instruments used in the research process in accordance with the aspects to be measured. Validation experts include material experts (hockey game experts) and material experts (Exercise Physiologists) (e) Final products packaged in a guidebook that is ready for dissemination.

Product Validation Results

Validation involves two experts, a hockey game material expert and an exercise physiologist. Validation of Expert Materials in the game of hockey. Based on the results of the assessment of the expert scale of the material (expert hockey game) in Table 3, in this case the expert hockey game material in the initial draft of the hockey game-based recovery model obtained a score of 44 out of a maximum score of 60 with a percentage of 73%. So at the validation stage the first material can be categorized as "Viable".

Table 3. Hockey game expert validation results.

No	Clarification	Scoring		Information
		X	Xi	
1	Accuracy of the material with the purpose of recovery	4	5	Good
2	Completeness of recovery material	4	5	Good
3	Material traces in accordance with systematics	3	5	Enough
4	Conformity of motion with the theory of exercise therapy	4	5	Good
5	Clarity of recovery material	3	5	Enough
6	Adequacy of duration for recovery	4	5	Good
7	Adequacy of reps in every move	4	5	Enough
8	Helps with the recovery process	3	5	Good
9	Motivate athletes to train or compete	3	5	Good
10	Easy and easy for athletes to do	4	5	Good
11	Facilities and tools used are easy to obtain because they use exercise tools on hockey.	4	5	Good
12	Description of motion on recovery model is easy to understand	4	5	Good
	Total	44	60	Proper

Source: Primary Data, 2021

Based on the results of the assessment of the expert scale of matter in this case exercise physiologists. It is further seen in Table 4 that in the initial draft the hockey game-based recovery model obtained a score of 45 from a maximum score of 60 with a percentage of 75%. So at the validation stage the first material can be categorized as "Viable".

Table 4. Results validation of exercise physiologists.

No	Clarification	Scoring		Information
		X	Xi	
1	Accuracy of the material with the purpose of recovery	4	5	Good
2	Completeness of recovery material	4	5	Good
3	Material traces in accordance with systematics Material traces in accordance with systematics	3	5	Enough
4	Conformity of motion with the theory of exercise therapy	4	5	Good
5	Clarity of recovery material	3	5	Enough
6	Adequacy of duration for recovery	4	5	Good

7	Adequacy of reps in every move	3	5	Enough
8	Helps with the recovery process	4	5	Good
9	Motivate athletes to train or compete	4	5	Good
10	Easy and easy for athletes to do	4	5	Good
11	Facilities and tools used are easy to obtain because they use exercise tools on hockey.	4	5	Good
12	Description of motion on recovery model is easy to understand	4	5	Good
	Total	45	60	Proper

After receiving validation from experts and improvements were made according to advice and input from experts, the researchers conducted a small-scale trial of the recovery model draft in Makassar, South Sulawesi, samples came from several hockey clubs in Makassar in February 2021. Subjects were given a draft evaluation sheet along with a questionnaire to provide responses to the recovery model provided. Subjects are given directions to perform recovery movements in accordance with procedures in draft recovery in the hockey field, namely after training and competing accompanied by researchers, the implementation of exercises is carried out in the same place.

Due diligence

The feasibility test has two stages: small-scale testing and large-scale testing. *Small-scale test*. The results of the small-scale assessment can be seen in Table 5. Based on Table 5, the assessment of small-scale trials can be seen that from the security aspect of 68% categorized as safe, from the aspect of convenience as 76% is categorized as easy, from the comfort aspect of 80% categorized as comfortable, the aspect of ministry by 61% is categorized as attractive, and the usefulness aspect of 80% is categorized as useful, so the overall data from the results of small-scale trial questionnaires is categorized as "Feasible".

Table 5. Small Scale Trial Results Data.

No	Aspects assessed	Score obtained	X max	%	Information
1	Safe	34	50	68	Safe
2	Easy	38	50	76	Easy
3	Comfortable	40	50	80	Comfortable
4	Pull	30	49	61	Pull
5	Useful	40	50	80	Useful

Source: Primary Data, 2021

Large-scale test

The results of large-scale assessments can be seen in Table 6. Based on Table 6, the assessment of the security aspect of 84% is categorized as safe, in terms of convenience by 78% is categorized as easy, in terms of comfort by 80% is categorized as comfortable, in terms of 70% sustainability is categorized as attractive, in terms of usefulness of 85% is categorized as useful. so the overall data from the results of large-scale trial questionnaires is categorized as "WORTHY".

Table 6. Large-Scale Trial Results Data.

No	Aspects assessed	Score obtained	X max	%	Information
1	Safe	84	100	84	Safe
2	Easy	78	100	78	Easy
3	Comfortable	80	100	80	Comfortable
4	Pull	70	100	70	Pull
5	Useful	85	100	85	Useful

Source: Primary Data, 2021

Effectiveness Test Results

Based on the results of small- and large-scale feasibility trials of hockey game-based recovery models that can be applied post-training or competing, the next step is an effectiveness test of 20 athletes.

This effectiveness test is carried out by the experimental method of control group pretest-posttest Design.

Training in the form of recovery models that are done after training and after competing. The effectiveness test aims to determine the benefits of recovery models for post-workout and match hockey players by measuring Pulse Rate (DN), Blood Pressure (TD), Breath Frequency (FN), and Fatigue Assessment Scale (FAS) fatigue measurement scale before and after doing exercises in the form of recovery models.

Table 7. Shapiro-Wilk Normality Test Results.

No	Variable	Significance	Information
1	DNTreatPre	0.29	Normal
2	DNTreatPost	0.00	Abnormal
3	SisTreatPre	0.17	Normal
4	SisTreatPost	0.38	Normal
5	DiasTreatPre	0.37	Normal
6	DiasTreatPost	0.12	Normal
7	FNTreatPre	0.02	Abnormal
8	FNTreatPost	0.05	Abnormal
9	FASTreatPre	0.23	Normal
10	FASTreatPost	0.12	Normal
11	DNKonPre	0.04	Abnormal
12	DNKonPost	0.03	Abnormal
13	SisKonPre	0.47	Normal
14	SisKonPost	0.38	Normal
15	DiasKonPre	0.26	Normal
16	DiasKonPost	0.33	Normal
17	FNKonPre	0.78	Normal
18	FNKonPost	0.18	Normal
19	FASKonPre	0.70	Normal
20	FASKonPost	0.49	Normal

Source: Primary Data, 2021

Based on the results of normality tests conducted using the Shapiro-Wilk method, in the SPSS output above, it can be known that based on the criteria that if the value of Asympt Sig >0.05 then the data is normal distribution. What if the opposite is the value of Asympt Sig < 0.05 then the data is not normal.

So that normal distributed data is carried out different tests using different Test Paired t-test, while data distributed abnormally is done different tests using the Wilcoxon Signed Ranks Test. The different test is done to find out if there is a difference between before and after doing the recovery model exercise.

Table 8. Hasil Uji Paired t-test.

No	Variable	Mean	Significance	Information
1	Hasil Uji Wilcoxon Signed Ranks Test	126.15 114.35	0.000	Significant Difference
2	DiasTreat Pre DiasTreat Post	82.65 73.30	0.000	Significant Difference

Source: Primary Data, 2021

Based on the table above in the treatment group at the level of significance of the value obtained 0.000 means that the significance value is less than 0.005 (P< 0.005) which is a significant difference between the Pretest-Posttest treatment group then Ho is rejected and Hi is accepted. It can be concluded that the hockey game-based recovery model is effective for Blood Pressure Recovery (TD). Furthermore, data that is distributed abnormally and data on a coordinated scale (Fatigue Assessment Scale (FAS) is conducted different tests using the Wilcoxon Signed Ranks Test.

Table 9. Wilcoxon Test Results Sign Up For Rankings.

No	Variable	Ties	Significance	Information
1	DNTreat Pre DNTreat Post	0	0.000	Significant Difference
2	FNTreat Pre FNTreat Post	1	0.001	Significant Difference
3	FASTreat Pre FASTreat Post	0	0.000	Significant Difference

Source: Primary Data, 2021

Based on the table above in the treatment group at the level of significance of the value obtained 0.000 and 0.001 means that the significance value is less than 0.005 (P<0.005) that is, there is a significant difference between the Pretest-Posttest treatment group then Ho is rejected and Hi is accepted. It can be concluded that the hockey game-based recovery model is effective for Pulse Recovery (DN), stabilizing Breath Frequency (FN) and Lowering Fatigue Assessment Scale (FAS) fatigue levels.

After the results of the data normality test and different tests (Paired t-test and Wilcoxon Signed Ranks Test) above, then there will be a homogeneity test, this test is done to find out if there are

similarities between the treatment group and the control group after doing the recovery model exercise.

Table 10. Homegeneity of Variances Test Results.

NO	Variable	Levene Statistic	Significance	Information
1	Sis Treat_Kon	1.395	0.245	Homogen
2	Dias Tret_Kon	1.229	0.247	Homogen
3	FAS Treat_Kon	1.357	0.251	Homogen
4	DN Treat_Kon	0.066	0.798	Homogen
5	FN Treat_Kon	7.899	0.008	Heterogen

Based on the results of the Homegeneity Of Variances test in the table above, the significance values in the treatment group and control group are: On Blood Pressure (TD) (cystol) obtained a significance value of 0.245 is said to be homogeneous. In Blood Pressure (TD) (diastol) obtained a significance value of 0.247 is said to be homogeneous. On the fatigue assessment scale (FAS) obtained a significance value of 0.251 said to be homogeneous. At the Pulse (DN) obtained a significance value of 0.798 is said to be homogeneous. While at Breath Frequency (FN) the significance value of 0.008 is said to be heterogeneous. So it can be concluded that the treatment group data and control group data in this study are the same (homogeneous) except in treatment group data and control group data on Breath Frequency (FN) is declared unequal (heterogeneous). Thus the data is normal distributed and has a homogeneous variance, then the test is done using the Independent Sample Test and data that is distributed abnormally, then the Mann-Whitney Test is used. The analysis of the data is viewed in the following table.

Table 11. Paired Samples Test Results Data.

NO	Variabel	Mean	Signifikansi Levene Statistic	Signifikansi
1	Sis Treat Sis Kon	114.35 117.05	0,24	0.003
2	Dias Tret Dias Kon	73.30 76.75	0,27	0.001

Based on the table above the average value in the treatment group on blood pressure (cystol) of 114.34, and in the control group of 117.05 at the level of significance of the value obtained 0.003 and the average value in the treatment group on blood pressure (disistol) of 73.30 and in the control group of 76.75 at the level of significance of the value obtained 0.001 means a significance value smaller than 0.005 (P< 0.005) that is a significant difference between the significance of the value obtained 0.001 meaning the significance value is less than 0.005 (P< 0.005). The treatment group and the control group Ho is rejected and Hi is accepted. It can be concluded that the hockey game-based recovery model is effective for Blood Pressure Recovery (TD).

Table 12. Mann-Whitney Test Results.

NO	Variabel	Mean	Signifikansi
1	DN Treat DN Kon	14.73 26.28	0.002
2	FN Treat FN Kon	18.55 22.45	0.002
3	FAS Treat FAS Kon	20.95 20.05	0.000

Based on the table above the average value in the treatment group on pulse (DN) of 14.73 and the control group of 26.28 level of significance of the value obtained 0.002 means that the significance value is less than 0.005 (P< 0.005) i.e. there is a significant difference between the treatment group and the control group then Ho was rejected and Hi accepted. It can be concluded that the hockey game-based recovery model is effective for Pulse Recovery (DN). The average value in the treatment group at breath frequency (FN) of 18.55 and the control group of 22.45 level of significance of the value obtained 0.002 means that the significance value is less than 0.005 (P< 0.005) i.e. there is a significant difference between the treatment group and the control group then Ho was rejected and Hi was accepted. It can be concluded that the hockey game-based recovery model is effective for stabilizing Breath Frequency (FN). And the average value in the treatment group on the Fatigue Assessment Scale (FAS) of 20.95 and the control group of 20.05 level of significance of the value obtained 0.000 means that the significance value is less than 0.005 (P< 0.005) which is a significant difference between the treatment group and the control group then Ho was rejected and Hi was accepted. It can be concluded that the hockey game-based recovery model is effective for lowering fatigue assessment scale (FAS) fatigue levels.

Based on the results of other tests above can be concluded recovery models developed effectively to lower pulse rate and normalize blood pressure, and effectively reduce respiratory frequency and reduce fatigue levels for hockey players post-training and compete. To find out how much effectiveness can be seen from the following table.

Table 13. Product Effectiveness Test Results.

Indicator	*Pretest*	*Posttest*	Decline (%)	Information
Pulse	104,60	75,40	-27, 91 %	Decreased, the lower the score the better the intensity of pulse recovery
Cystol Diastol Blood Pressure	126,15 82,65	114,35 73,30	-9,35 % -11,31 %	Decreased (Stable), the lower the score the better the intensity of blood pressure recovery
Frequency of Breath	21,45	18,00	-16, 08 %	Decreased, the lower the score the better the intensity of recovery of breath frequency
Fatigue Scale	26,70	20,30	-23, 97 %	Decreased, the lower the score the better the intensity of recovery fatigue rate

Based on the table above on pulse obtained a pretest value of 104.60 and Posttest of 75.40 so as to get a decrease in pulse rate of -27.91%. In the blood pressure of the sausage the pretest value is 126.15 and the Posttest is 114.35 so that it gets a decrease in systole blood pressure of -9.35% and in diacetol blood pressure the pretest value is 82.65 and posttest by 73.30 so as to get a decrease in diastol blood pressure of -11.31%. In the frequency of breath obtained a pretest value of 21.45 and Posttest of 18.00 so as to get a decrease in the frequency of breath by -16.08%. On the fatigue scale, the pretest value of 26.70 and posttest of 20.30 resulted in a decrease in breath frequency of -23.97%.

Discussion

The study subjects numbered 20 hockey athletes who had done training or competing, a recovery model that had been developed as measured by instruments to measure pulse (DN) and blood pressure (TD) using a digital blood pressure gauge (yuwell), measuring breath frequency using a stopwatch (Kadio) and measuring fatigue level (FAS) using (Fatigue Assessment Scale). Effectiveness tests are conducted to find out if the recovery model that has been developed is effective for use.

The results obtained based on the data that has been obtained showed that after doing recovery after training and competing the 20 subjects showed significant differences before and after receiving treatment in the form of recovery. The success rate of the recovery model is derived from:

1. Pulse (DN) of -27.91%. According to McDermott, et al. (2017) Physical activity gives a different response to the sympathy nerves and also the nerves of the sympathetic after exercise. As a result of this change, the pulse between athletes and non-athletes will be different. This change is positive when viewed from the physiology of the human body. When sympathetic nerve sympathetic exercise gives a strong enough response to the heart to pump blood quickly throughout the body, conversely at rest the parasympathetic nerve response will control the performance of the heart so as not to beat too hard. Increased MAX VO2 is particularly beneficial for athletes, through aerobic physical exercise influenced by physical exercise, cardiovascular function, body composition, and decreased heart rate. In the main physical exercise to the cardiovascular response is an increase in cardiac output caused by an increase in the contents of the heart and heart rate that can reach 95% of the maximum level, oxygen cooking is not faster than the cardiovascular system(Jornan et al., 2013). Blood flow is also redistributed to organs other than muscles as a result of sympathetic vasoconstriction, blood flow to the kidneys and splanchnic 25% is at rest during which the blood flow is focused to the muscle during strenuous exercise. And after strenuous exercise (rest/ recovery) there will be an integrative point that 80% of cardiac output is returned to the human brain, heart, kidneys, and liver (Dinger, M., Thatcher, J. B., Treadway, D., Stepina, L., Breland, 2015).

2. Normalizes blood pressure (TD), a decrease in systoln blood pressure by as much as -9.35% and decreased blood pressure diastole -11.31%. The effect of sport massage on blood circulation, lymph, skin, muscles and nerves according to Wijanarko & Riyadi (2010), explained as follows: a) The effect of sport massage on blood circulation and lymph; b) The effect of sport massage on the skin; c) The effect of sport massage on muscle tissue; d) Effect of Sport massage on retirement. Massage techniques are specifically the idea of producing local improvements in the blood circulation of the skelet muscles through several mechanisms. The mechanism directly exerts an effect on the circulatory tissue, changes in circulation that are secondary to local release from the vasodilator and decreased reflexes in the sympathetic nerve caused by directly stimulating the tissue (Wijanarko & Riyadi, 2010). Blood flow to the muscles to transport oxygen and nutrients needed to the muscles that are working. Researchers found 8 that not only did the flow greatly increase approximately 13-fold during physical work, but decreased flow during muscle contractions, researchers obtained resting blood flow data of 3.6 ml/100 g of muscle/minute and blood flow during maximum work of 90 ml/100 g of muscle/minute, so a maximum increase of approximately 25 times the loipat during work, This increase is due to the direct influence of muscle metabolism (Guyton & Hall, 2017).

3. Decreased the frequency of breath (FN) by 16.08%. Forms of activity that can speed up lactate recovery are increasing the oxidation and gluconeogenesis processes, many involving red muscle fibers and speeding up the distribution of lactate to the liver (Guyton & Hall, 2017; Powers & Edward, 2007). By doing sports will form new blood vessels. That way, it can facilitate the circulation of oxygen throughout the body. The more oxygen absorbed, the better the body at repairing damaged tissues. VO2 max is the functional and capacity value of cardiorespiratory. Larson, et al. (2015) says that VO2 max determines how efficiently muscles use oxygen from the air, as a marker of fitness, health and as the gold standard of overall indicators of human health (Larson, L. R., Stedman, R. C., Cooper, C. B., & Decker, 2015). VO2 max is not only influenced by the characteristics of cardiorespiratory but muscle growth and changes in muscle metabolism, with high-intensity exercise allowing the limitations of the cardiovascular system due to deficits of oxygen caused by peripheral fatigue (metabolic acidosis) (McDermott, et al., 2017). Pulmonary faal is said to be normal if the work of ventilation, distribution, perfusion and diffusion processes, as well as the relationship between ventilation and perfusion in the person in a relaxed state produces a normal partial pressure of arterial blood gas (PaO2 and PaCO2).

Ventilation concerns the volume of air moving in and out of the nose or mouth in the process of breathing, ventilation per minute VE (minute ventilation) the volume of air coming out of the lungs in one minute measured in liters, VT = the volume of air entering and exiting one breath, and f = frequency of breath per minute and expressed in the formula VE = VT x f . Alveolar ventilation, VA (alveolar ventilation) is an inspiring air volume that can reach the alveoli and can experience gas exchange with blood, free ventilation, VD 10 (wasted ventilation, dead space ventilation) is an inspiring air volume that does not experience gas exchange with blood VE = VT x VA. The distribution of the process after ventilation with air entering the airway is distributed throughout the lungs, then into the alveoli. Tidal volume air (u.dara that enters and exits in one breath) is approximately 500 ml in the small volume as much as the existing alveoli, uneven distribution because the first air inhaled into the top of the lung and followed by the air behind it, entering the base of the lung, this results in a greater ventilation value at the top of the lung. Perfusion is the circulation of blood in the pulmonary capillaries, when there is an increase in cardiac output, pulmonary circulation can accommodate it without any change in pressure in the pulmonary artery, blood flow is so affected by the earth's gravity that the perfusion at the base of the lung is greater than perfusion in the apex, this results in a different ratio of V/Q in the base of the lung and the pulmonary peak. The existence of differences in perfusion gives rise to the idea of dividing the lungs into 3 zones namely zone 1, zone 2, zone 3 based on the relationship between pressure in the arteries (Pa), alveolus (PA), and veins (PV). Diffusion is defined as the transfer of molecules from an area with a high molecular concentration to an area with a lower concentration, the sequence of diffusion is divided into: diffusion in the gas phase, and diffusion when penetrating the membrane of the alveoli-capillary barrier (Guyton & Hall, 2017; Phytanza, Burhaein, Lourenço, et al., 2021).

Decrease fatigue assessment scale (FAS) fatigue rate by -23.97%. Optimization of recovery techniques is important to do considering that good recovery quality can reduce fatigue both objectively and subjectively (rating of perceived exertion), improve the physiological adaptation of the body to physical exercise and reduce the risk of depont injury, et al., 2004 in (Hartono et al., 2012; Phytanza et al., 15 C.E.; Phytanza, Burhaein, Lourenço, et al., 2021; Phytanza, Mumpuniarti, et al., 2021).

Conclusion

Based on the results of research and the results of the development of a hockey game-based recovery model, research conclusions and development results can be taken. 1) A hockey game has been compiled - based on a recovery model consisting of 23 movements with a duration of 15 minutes and has been validated by experts; 2) Hockey game-based recovery model is feasible for hockey athletes both in terms of safety, convenience, comfort, and usefulness; 3) Hockey game-based recovery model is effective for restoring fatigue with indicators: decreased pulse (DN), breath frequency (FN) and decreased fatigue assessment scale (FAS), as well as normalizing blood pressure (TD), with effectiveness of decreased pulse (DN) by -27.91%, breath frequency (FN) of -16.08%, and Fatigue Assessment Scale (FAS) of -23.97%, as well as normalizing blood pressure (cystol) by -9.35% and darag diastol pressure -11.31%.

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Conflict of Interests
All authors state that there is no conflict of interest in this study.

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Corresponding author:
Erick Burhaein[3]
[3]Department of Sports Education,
Universitas Ma'arif Nahdlatul Ulama Kebumen, Indonesia
E-mail: erick.burhaein@umnu.ac.id