International Journal of Sport, Exercise and Health Research

Research Article

IJSEHR 2021; 5(1): 14-16

www.sportscienceresearch.com
Received: 04-12-2020
Accepted: 14-03-2021

Correlation of Selected Kayak Pro Parameters In-land and In-boat

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Abstract

There is no adequate research on the validity of rowing ergometers in measuring paddling performance of Paradragon Boat paddlers. This study then aimed to determine the validity of a specific rowing ergometer in measuring paddling performance. This study used a prospective correlational research design. The study was conducted in a sea channel and a university gym. Ten paddlers in a non-profit organization paddled on a rowing ergometer and in-boat on actual seawater. The time duration, number of strokes, and speed of each subject per 200 m, 500 m, and 2000 m were recorded. Pearson Correlation Coefficient was used to determine the correlational relationship between paddling parameters in-land and in-boat. Validity coefficients showed strong positive relationship between ergometer and in-boat performance in all assessed technical parameters: time (200 m: r = 0.89; 500 m: r = 0.90; 2000 m: r = 0.84), number of strokes (200 m: r = 0.88; 500 m: r = 0.91; 2000 m: r = 0.82), and speed (200 m: r = 0.87; 500 m: r = 0.89; 2000 m: r = 0.82). Therefore, the rowing ergometer is a valid tool in assessing paddling performance of Paradragon boat paddlers.

Keywords: Adaptive, Ergometer, Dragon boat, Paddler, Validity.

INTRODUCTION

Tracing its origin from China, Dragon boat racing is a competitive water sport that typically comprises groups of 18-20 paddlers, a drummer, and a steerer coordinating to propel a standard size Dragon boat across distances that range from 200 m to 2000 m [1]. Ever since the establishment of the International Dragon Boat Federation in 1991, Dragon Boat sport has been increasingly emerging as a recognized competitive sport across the world [2]. Dragon boat racing has already been in the sports world for several years, but it has only recently opened its doors to adaptive sports category, Paradragon Boat racing. A Paradragon boat team is similar to a Dragon boat team in terms of positions, but the participants consist of PWDs or "Persons with Disabilities," which are described by the IDBF as "paddlers who have some form of physical, psychological, neurological, sensory, developmental or intellectual impairment" [1].

Dragon Boat racing has only been developing for a number of years since getting recognition with its international competition only launched in 1995, hence, there is limited research on the scientific facet of this sport. Scientific research would then play a crucial responsibility in the further development as taking up a scientific approach towards analysis of performance and research can profoundly facilitate in attaining sporting success [2].

Quantifying and evaluating work output has been proven critical to the understanding of sports such as Dragon Boat racing, especially with the limited research on the sport. This evaluation can be carried out through assessment with field tests (saltwater or freshwater environment in an actual boat) or under simulated conditions in laboratory environment using specific ergometers [3].

Ever since Pyke and company designed and created a kayak ergometer in 1973, a number of researchers and engineers alike have tried to create a simulation of the real conditions of paddling of flat-water kayaking sport [3]. Studies conducted have substantiated the reliability of this kayak ergometer in evaluating flat-water kayaking performance as these studies have explored the analysis of technical actions on these ergometers, which have suggested high levels of coincidence between ergometer and

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flat-water paddling with reference to biomechanics (positions and motions of different parts of the body) and physiological variables (cardiopulmonary components) [4, 5, 6, 7].

Despite all of the abovementioned studies, all of which explored the specific field of flat-water kayaking and kayak ergometers, there remains very limited research and information on the field of Dragon Boat rowing/ paddling and the technical parameters of rowing/ paddling, most especially in Paradragon boat. Considering the novelty of this adaptive sport, the lack of scientific exploration makes sense. There has not been a lot of studies made on the validity of rowing ergometers in evaluating rowing/ paddling performance in terms of technical parameters.

Therefore, this paper will determine the validity of Kayak Pro rowing ergometer in defining rowing performance by establishing the correlational relationship of selected technical parameters (time duration, number of strokes, speed) per 200 m, 500 m, and 2000 m in a Kayak Pro rowing ergometer and in an actual boat on saltwater of the adaptive paddlers in a non-profit organization. It was hypothesized that there would be a relationship between the ergometer parameters in-land and the parameters in-boat (or on saltwater).

METHODS

This study started on the third week of January 2020 and ended on the first week of March 2020. Correlational research design was used, specifically, prospective research design. Ten (10) paddlers were recruited from a non-profit organization. Informed consent was obtained and an explanation of the risks, benefits, and compensation was provided. The venues where the study was conducted were as follows: a sea channel where the participants held in-boat paddling and a university gym where the Kayak Pro rowing ergometer paddling was held.

The researchers utilized a Kayak Pro rowing ergometer with built-in parameters that determined the distance covered, time duration, number of strokes, and speed performance of the subjects. The researchers used a high-resolution camera to document the performance of the subjects during in-boat paddling. Data collection started on the third week of January 2020 and ended on March 7, 2020. The subjects received initial assessment of vital signs before their training. The researchers set distances to be reached in both the Kayak Pro ergometer and in-boat paddling. The said distances were: 200 meters, 500 meters, and 2,000 meters. The time it took for each subject to cover the distance in seconds and the number of strokes was recorded. The data collected was gathered and analyzed to determine the correlational relationship of selected parameters between Kayak Pro ergometer paddling and actual in-boat paddling.

Statistical Analysis

A Pearson correlation coefficient was used to analyze and determine e correlational relationship of selected parameters between KayakPro ergometer paddling and actual in-boat paddling.

RESULTS AND DISCUSSION

Each subjects' time duration (in minute) per 200 m, 500 m, and 2000 m both in Kayak Pro ergometer and in boat were recorded and collated (Refer to Table 1). The same paddlers were assessed and evaluated. The number of strokes per 200 m, 500 m, and 2000 m both in Kayak Pro ergometer and in boat were recorded and collated (Refer to Table 2). The subjects' speed (meters/second) per 200 m, 500 m, and 2000 m both in Kayak Pro ergometer and in boat were recorded and collated (Refer to Table 3).

Table 1: Time duration (in minutes) per 200 m, 500 m, 2000 m in Kayak Pro ergometer and in-boat.

Subjects	200 m		500 m		2000 m	
	Ergometer	In-boat	Ergometer	In-boat	Ergometer	In-boat
1	00:47.5	00:53.3	2:09.5	2:15.9	10:27.1	10:56.2
2	00:49.0	00:52.0	2:18.3	2:27.6	11:15.0	11:35.3
3	00:51.6	00:55.1	2:09.5	2:22.5	10:31.5	10:55.5
4	00:54.8	01:01.3	2:35.3	2:43.2	13:09.4	13:47.6
5	00:45.4	00:49.1	2:06.7	2:11.2	10:21.9	10:44.6
6	00:49.1	00:53.6	2:22.4	2:29.5	11:05.3	11:25.7
7	01:03.0	01:10.5	2:54.8	3:20.2	14:19.5	14:53.8
8	00:55.8	01:00.5	2:40.8	2:46.6	11:02.1	11:37.2
9	00:52.7	00:57.9	3:00.6	3:08.3	11:25.5	11:44.9
10	00:46.1	00:52.4	2:06.9	2:13.9	10:51.9	11:26.3

Table 2: Number of strokes per 200 m, 500 m, and 2000m in Kayak Pro ergometer and in-boat.

Subjects	200 m		500 m		2000 m	
	Ergometer	In-boat	Ergometer	In-boat	Ergometer	In-boat
1	58	65	144	159	596	615
2	58	67	145	159	598	618
3	57	67	137	154	562	585
4	61	70	150	164	610	625
5	55	63	139	153	581	588
6	57	65	138	151	569	587
7	64	75	152	169	610	639
8	55	64	134	147	545	562
9	59	67	145	160	605	619
10	58	67	142	156	586	594

Table 3: Speed (meter/second) per 200 m, 500 m, and 2000 m in Kayak Pro ergometer and in-boat.

Subjects	200 m		500 m		2000 m	
	Ergometer	In-boat	Ergometer	In-boat	Ergometer	In-boat
1	4.21	3.75	3.86	3.68	3.19	2.98
2	4.08	3.85	3.62	3.34	2.97	2.63
3	3.88	3.63	3.86	3.51	3.17	2.75
4	3.65	3.26	3.22	3.06	2.53	2.10
5	4.41	4.07	3.95	3.81	3.23	3.02
6	4.07	3.73	3.51	3.34	3.01	2.71
7	3.17	2.84	2.86	2.49	2.33	1.69
8	3.58	3.31	3.11	3.02	3.02	2.84
9	3.80	3.45	2.77	2.65	2.92	2.63
10	4.34	3.82	3.94	3.73	3.07	2.79

A Pearson Correlation Coefficient was conducted to determine the correlation relationship between the subjects' paddling performance on Kayak Pro rowing ergometer and in-boat on actual saltwater in terms of time, number of strokes, and speed in each of the predetermined distances of 200 m, 500 m, and 2000 m. Validity coefficient showed strong positive relationship between ergometer and in-boat performance in all assessed technical parameters: time (200m: r 0.89; 500 m: r= 0.90; 2000 m: r= 0.84), number of strokes (200 m: r= 0.88; 500 m: r= 0.91; 2000 m: r= 0.82), and speed (200 m: r= 0.87; 500 m: r= 0.89; 2000 m: r= 0.82).

The limitations of the study were that it only involved measuring the time, number of strokes, and speed at a predetermined distance at a constant resistance level and the assessment of the participants' performance were limited to the given parameters.

CONCLUSION

The results revealed a strong positive relation between Kayak pro rowing ergometer and in-boat performance in terms of time, number of strokes, and speed in each of the predetermined distances of 200 m, 500 m, and 2000 m. This means that the rowing ergometer was able to precisely measure the technical parameters of paddling in a simulated context. Therefore, the Kayak pro rowing ergometer is a valid tool in assessing paddling performance of Paradragon Boat paddlers.

With this, the Kayak Pro rowing ergometer can then be considered a deterministic model for paddling performance for an adaptive paddling team by defining said ergometer as reference from which the team can base-off their testing and training. This would present an opportunity for further improvement of the team's performance and achievement of sporting success.

Conflicts of Interest

The authors declare that they have no affiliations with or involvement in any organization or entity with any financial or non-financial interest in the subject matter or materials discussed in this manuscript.

Authors' Contribution

Edzelle Naquila: Conceptualization, Methodology, Writing – Original and Revision. Nellen Yadao: Investigation, Data Curation, Writing – Revision. Angelique Baricuatro: Investigation, Data Curation, Writing – Revision. Sergio Sarza Jr.: Validation, Formal Analysis, Writing – Review & Editing, Supervision, Project Administration.

Acknowledgment

The author would like to acknowledge the paddlers of the PADS Adaptive Dragon Boat team with the leadership of Mr. John Paul E. Maunes, for their full cooperation throughout the whole duration of the study.

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