The Influence of Training Strategy and Physical Condition toward Forehand Drive Ability in Table Tennis

F W Langitan
Universitas Negeri Manado, Tondano, 95618, Sulawesi Utara, Indonesia
fentjewelliamlangitan@gmail.com

Abstract. The objective of this research is to find out the influence of training strategy and physical condition toward forehand drive ability in table tennis of student in faculty of sport in university of Manado, department of health and recreation education. The method used in this research was factorial 2x2 design method. The population was taken from the student of Faculty of Sport at Manado State University, Indonesia, in 2017 of 76 students for sample research. The result of this research shows that: In general, this training strategy of wall bounce gives better influence toward forehand drive ability compare with the strategy of pair training in table tennis. For the students who have strong forehand muscle, the wall bounce training strategy give better influence to their ability of forehand drive in table tennis. For the student who have weak forehand muscle, pair training strategy give better influence than wall bound training toward forehand drive ability in table tennis. There is an interaction between training using hand muscle strength to the training result in table tennis using forehand drive.

1. Introduction
Table tennis is one of the favorite sport in community, especially in school and also in university. This is not only because of this sports is part of school/ university curriculum but table tennis is also an exciting sport that can be played outdoors or indoors ( inside a house) with cheaper equipments [1]. It also doesn't required a large space. It can be played by all family member, gives body health for young or old age, entertaining and for the disables can play this kind of sport.

However, Table tennis required complete equipments to achieve a better performance. It needs training strategy, mastering of training technique. A good athlete who wants to achieve a high performance should have a good physical condition : strength, endurance, muscular power, speed, coordination, flexibility, agility, balance, accuracy, reaction. Moreover, mastering the basic techniques, including forehand strike, needs to be practiced systematically and continuously. Harsono stated that "The main objective in training is to maximize the improvement
of one's skills" [2]. Thus, with training strategy, physical condition and good basic technique, table tennis could become a dynamic sport and rich of movement.

One of the strikes in table tennis is forehand drive. It's a facing front hand stroke. Forehand is commonly used by righthand and hit from right side [3]. The definition of Forehand drive according to Larry Hodges in Elementary book of Tabel Tennis, is a stroke using paddle and it’s moved to the right elbow direction for the right-handed and to the left for left-handed [4]. Peter Simpson in the book Ping Pong Technique, explain briefly that forehand drive is a stroke in right side [5].

The purpose of this research is to test the influence of (wall bounce and pairing) strategy and condition of physical strength of arm muscle towards forehand stroke in table tennis to students of FIK Manado state university. The research of Tjatjo [6], about wall bouncing method and pairing method, is also discussed in my research about the strategy off wall bouncing practice and pairing practice strategy [7].

2. Methods
This research was carried out in sport center of Manado state university in Tondano, Minahasa north Sulawesi. The research duration was 8 weeks with the frequency three times per week, 18 meetings. Each meeting is 120 minutes. The research method is Experimental method with factorial 2x2 design [8]. The variables using in this research were free variable, attribute variable, given variable as described above: Given variable is forehand drive. Free variables were practice strategy [9] e.i. (i) the strategy of wall bounce training and (ii) pairing training. The population of this research is all the students of FIK UNIMA Tondano, in 2016/2017. The main target population of this research is 80 students of sports education department, as the total sampling. The data analyzing technique used in this research is two ways variant analyzing technique (ANAVA), significant $\alpha = 0.05$. The requirements in using this analyzing is normality and homogeneity test. Lillefors test for Normality and Bartlet for homogeneity test. If there is an interaction, the test will continue using Tukey test [10].

3. Results and Discussion
The analyzing using ANAVA technique [11] showed that $F_{observed} = 4.40$, bigger than $F_{table}$, 4.11 ($F_{observed} = 4.40 > F_{table} = 4.11$), that is why $H_0$ is rejected and $H_1$ is accepted. From the calculation above it concluded that overall, there is a significant influence between wall bounce training strategy with paring training strategy in table tennis. In other words it is concluded that the ability of training result of forehand drive in table tennis using wall bounce technique ($X = 29.6$ and $S = 4.25$) is better than the ability using pairing training ($X = 28.45$ and $s = 2.86$). The first research hypothesis states that Glass.

The calculation about different influence of ability using forehand drive in table tennis to a group that has muscular strength using the technique of wall bounce training and pairing training (P1 : P2). The conclusion result using Tukey test as showed in Table 1.
Table 1. The conclusion result using Tukey test.

| No | Group for Comparison | Q_{calc} | Q_{table} | Notes   |
|----|----------------------|----------|-----------|---------|
| 1  | P1 with P2           | 4.49     | 3.79      | Significant |
| 2  | P4 with P3           | 0.80     | 3.79      | Significant |

The Table 1 shows that Q_{calc} = 4.49 bigger than Q_{table} = 3.79 or Q_{calc} > Q_{table} in significance level, therefore zero hypotheses (H0) was denied and alternative hypothesis (H1) was accepted. It means that the results in forehand in table tennis from the group with strong muscle, trained with the wall bounce strategy (X = 33.3 and S = 1.90) was higher than pairing strategy (x = 30.5 and s = 1.90). This proved that the group with strong muscle trained with wall bounce strategy had higher forehand capability compared with paired training strategy.

The next analysis was using Turkey Assessment to compare groups with weak muscle. These two experiments referred to the opinion of Gane V. Glass. It was about calculation on the difference influence to the table tennis forehand for the group with strong muscles, trained pairing and wall-bounce strategy (P4 : P3).

The Table 1 shows that Q_{calc} = 0.80 bigger than Q_{table} = 3.79 or Q_{calc} > Q_{table} in significance level, therefore zero hypothesis (H0) was denied and alternative hypothesis (H1) was accepted. It means that the results in forehand in table tennis from the group with strong muscle, trained with the wall bounce strategy (X = 26.4 and S = 2.07) was higher than pairing strategy (X = 25.9 and S = 2.02). This proved that the group with strong muscle trained with wall bounce strategy had higher forehand capability compared with paired training strategy.

The conclusion showed that from the variety analysis showed the F_{addition} = 6.99 and F_{table} = 4.11 or F_{addition} > F_{table}. Therefore, zero hypothesis (H0) found that the interaction between training strategy and arm muscle strength with training results from forehand drive in table tennis was dismissed and the alternative hypothesis was accepted. In other words, level of achievement in forehand drive in table tennis was influenced by the existence of interaction between practice strategy and arm muscle strength.

According to the result of this research, the score rate of forehand drive ability in table tennis from the group of those who had strong arm muscle, trained by using strategy of wall bounce practice is 33.3. The group who had weak arm muscle got 25.9. The average score for the ability of forehand drive from those in group of pairing training got score 30.5 and the group which had weak arm muscle got score 26.4.

The hypothesis based on the fourth research stated that there is an interaction between training strategy and arm muscle strength to the ability of forehand drive in table tennis had been proved.

Forehand drive ability is an important technique in table tennis [12]. The modern table tennis requires every player to be able to posses forehand drive technique to develop various spin drive techniques. Therefore, it needs appropriate practice strategy to develop forehand drive. This research used two practice strategies, wall-bounce practice and pairing, which aimed to see which strategy was better than the other to improve forehand drive in table tennis. It found out that these two strategies had similar goals, but were different in implementation.

Wall-bounce training strategy is a training by bouncing the ball to the wall with forehand drive. Pairing practice in other hand, involves two persons with repeating moves.
Results from the movement analysis of these two trainings were supported by results from variant analysis about the overall different in effectiveness, $F$. Column observation ($F_{O}$) = 6.99, greater than $F$ table, 4.11 ($F_{O} = 6.99 > F_{t} = 4.11$). Results from the wall-bounce training strategy was ($X = 29.6$ and $S = 4.25$) compares to the pairing practice, ($X = 28.45$ and $S = 2.86$). Overall, it could be concluded that the wall-bounced training strategy was better than pairing practice in improving forehand drive in table tennis.

The above results from movement analysis were supported by the results from the group with strong arm muscle in wall bounce training (P1) in comparison to the group with pairing practice strategy (P2): $Q_{calc.} = 4.49 > Q_{table} = 3.79$. In other words, students with strong arm muscle had higher effectiveness level with wall-bounce training strategy, ($X = 33.3$ and $SD = 189$) compared to the pairing practice ($X = 30.5$ and $SD = 1.90$).

The analysis was also supported by the results from the strategy (P4) with the group with weak arm muscle trained in wall bounce practice (P3) with the results was following: $Q_{(0.0)} > Q_{table} = 3.79$. In other words, students with weak arm muscles had better strategy effectiveness ($X = 26.4$ and $SD = 2.07$).

Results from the 2 x 2 alternative variants stated that interaction between training strategy with arm muscle strength in table tennis which showed $F_{observed} = 6.99 > F_{table}(0.05) = 4.11$. This interaction showed that well-bounced training strategy was more suitable to the students with strong arm muscle compared to the pairing practice strategy, A1 B1 > A2B1. In the contrary, pairing practices was suitable to the students with weak arm muscle compared to the wall-bounce training, A2B2. This finding was furthermore supported from the comparison results between wall-bounce training strategy and pairing practice both with strong arm muscle, A1B1 : A2B1 (P1 : P2, $Q_{calc.} = 4.49 > Q_{table} = 3.79$). In other words, effectiveness of wall-bounce training strategy with strong arm muscle ($X = 33.3$ and $SD = 1.89$) was better than the pairing practice strategy ($X = 30.5$ and $SD = 1.90$). Pairing practice strategy and wall-bounce training strategy both with weak arm muscle: A2B2: A1B2 (P4 : P3), $Q_{calc.} = 0.80 > Q_{table} = 3.79$. In other words, effectiveness of pairing practice strategy with weak arm muscle ($X = 26.4$ and $SD = 2.07$) was better than wall-bounce training strategy ($X = 25.9$ and $SD = 2.02$).

4. Conclusion
In summary, wall-bounce training strategy gives more and better influence to the results in practicing forehand drive in table tennis, compares to pairing practice. To the students with strong arm muscle, wall-bounce training strategy gives better influence in the results of forehand drive training in table tennis, compares to pairing practice. In the contrary, for the students with weak arm muscle, pairing practice strategy creates better results in comparison to the wall-bounce training strategy. The research finding proves that there was an interaction between training strategies with arm muscle strength towards the results from forehand drive training in table tennis.

Acknowledgments
The authors wish to thanks for Dirlitabmas, Dirjendikti, Ministry of Education and Culture of the Republic of Indonesia which had finance all of the research activities.
References

[1] Santoso T, Setiono H and Sulaiman 2017 Developing Return Board as an Aid for Forehand Topspin in Table Tennis The Journal of Educational Development, JED 5 2 210 – 223

[2] Kondrič M, Zagatto A M and Sekulić D 2013 The Physiological Demands of Table Tennis Journal of Sports Science and Medicine 12 362-370

[3] Jospin L, Fayt V and Lazzari S 2006 Influence of Training and Task Difficulty On Efficiency of a Forehand Drive in Table Tennis IV Congreso Mundial de Ciencia y Deportes de Raqueta 21-23

[4] Raab M, Masters R S W, and Maxwell J P 2005 Improving the ‘how’ and ‘what’ decisions of elite table tennis players Human Movement Science 24 3 326-344.

[5] Simpson P 1984 Teknik Bermain Pimpong, Pioner Jaya: Bandung

[6] Tjatjo A H 1985 Metode Latihan Pantulan Tembok dan Berpasangan Melalui Pola Distributes dan Massed terhadap Hasil Latihan Keterampilan Bermain Lawan Tennis Disertasi Pascasarjana UNJ: Jakarta

[7] Decety J, Grèzes J, Costes N, Perani D, Jeannerod M, Procyk E, Grassi F and Faszio F 1997 Brain activity during observation of actions. Influence of action content and subject's strategy Brain 120 10 1763–1777

[8] Safari I, Suherman A and Ali M 2017 The Effect of Exercise Method and Hand-Eye Coordination Towards the Accuracy of Forehand Topspin in Table Tennis IOP Conf. Series: Materials Science and Engineering 180 012207

[9] Brunnett G, Rusdorf S and Lorenz M 2006 V-Pong: an immersive table tennis simulation IEEE Computer Graphics and Applications 26 4 10-13

[10] Reinoud J, Bootsma R, Houbiers M, Whiting H and Wieringen P 1991 Acquiring an Attacking Forehand Drive: The Effects of Static and Dynamic Environmental Conditions Research Quarterly for Exercise and Sport 62 3

[11] Young K H 2014 Analysis of variance (ANOVA) comparing means of more than two groups Restorative Dentistry & Endodontics 39 1 74–77

[12] Bootsma R and Wieringen P 1990 Timing an attacking forehand drive in table tennis Journal of Experimental Psychology: Human Perception and Performance 16 1 21-29