

# Analysis of Anthropometric and Playing Ability of Indian Senior Men Wheel Chair Basketball Players with Reference to their Sport Class

C. Maheswaran<sup>1</sup>, Dr. S. Sakthivel<sup>2</sup>

<sup>1</sup>II M. P. Ed, Faculty of General & Adapted Physical Education and Yoga, Ramakrishna Mission Vivekananda Educational and Research Institute, Coimbatore, Tamilnadu, India

<sup>2</sup>Assistant Professor, Faculty of General & Adapted Physical Education and Yoga, Ramakrishna Mission Vivekananda Educational and Research Institute, Coimbatore, Tamilnadu, India - 641020.

Correspondence Author Email: [sakthivels\[at\]cbe.rkmvu.ac.in](mailto:sakthivels[at]cbe.rkmvu.ac.in)

**Abstract:** ***Aim:** The aim of this study was to examine the analysis of anthropometric and playing ability of Indian senior men wheel chair basketball players with reference to their sport class. **Method:** Achieve this purpose thirty - two men Wheelchair Basketball Players who were attending the Indian Wheelchair coaching camp during the year 2022 at Ramakrishna Mission Vidyalaya, Coimbatore, Tamilnadu. Their age ranged between 22 and 42 years. 30 subjects were getting informed context. Further the sport class from 2 to 4.5 were selected as subjects for this study. The following variables were measured with standard test items: standing height, body weight and playing ability. Descriptive statistics of each criterion variables were computed. In all the cases, 0.05 level of significance was fixed. To evaluate the mean difference between the sport class of Wheelchair Basketball players, Analysis of Variance (ANOVA) was computed. **Results:** alternative hypothesis ( $H_a$ ): [ $H_a$ : mean  $\mu_1$ :  $\mu_2 \neq \mu_3$ ] stated that there is no significant mean difference exists on anthropometric characteristics and playing ability of Indian wheelchair Basketball players with reference to the sport class. **Conclusion:** Among the sport class, 4.5 classification have dominated in all the selected anthropometric characteristics of Indian senior men wheelchair Basketball players. The role played by each sport class is not same and the structure provides distinct advantage among Indian senior men wheelchair Basketball players. The playing ability of the distinct sport class 4.5 has due weightage than the other sport class in terms of performance.*

**Keywords:** Standing Height, Body Weight, Playing Ability and Senior Men Wheel Chair Basketball Players

## 1. Introduction

Wheelchair basketball is one of the most popular and well - known adapted sports (Croft *et al.*, 2010), and in 1993, the International Wheelchair Basketball Federation (IWBF) was established as its world governing body with full responsibility for its development. Nowadays, the main official competitions of the IWBF are the World Championships and Paralympics Games, which implies that competitiveness is increasing, and it is becoming more important to monitor the fitness characteristics and performance of Wheelchair basketball players. Research Laboratory tests have commonly been used to assess physical fitness and performance, and as a result, the literature on laboratory testing is more abundant than the literature on field - based testing (Goosey and Leicht 2013). Many published studies analyze the anthropometric measures (Molik *et al.*, 2010).

Over the past twenty years, wheelchair basketball has progressive significantly. The pool of possible players has been widened by the inclusion of athletes with conditions other than neurological impairments and those with minor physical impairments of the lower extremities. While a great deal of athletes possess normal arm and hand function, the main differences between classes are sitting balance and trunk control, which have an effect on the player's ability to catch and pass the ball. Five players make for a team, and the total points scored must be 14 or less. First and foremost, to enable people with disabilities to enjoy the thrill of high performance and to maximize each athlete personally.

Without a doubt, the elite achievements of disabled athletes have a profoundly positive effect on the identities of people with disabilities and the relationships between people with and without disabilities. Athletes that serve as role models in elite sports may help to inspire more people with physical limitations to take up their sport ([www.physiopeedia.com](http://www.physiopeedia.com)).

Competitive sport for those with disabilities has been growing rapidly in recent years (Bhambhani, 2002). Players in wheelchair basketball must possess the physical and mental skills necessary to adapt correctly to game demands. Strength, endurance, speed, and flexibility are all important components of an athlete's physical preparation. The general desire to exercise, the want to train as hard and as long as possible, and the desire to have the correct incentives are all parts of the mental state. The biological factors that contribute to effective performance and that must always be enhanced include flexibility, strength, anaerobic capacity, and aerobic capacity.

## 2. Classifications (Sport Class)

Classification is an international regulation for playing wheelchair Basketball to harmonize players' different levels of disabilities. All teams which compete above a recreational level use the classification system to evaluate the functional abilities of players on a point scale of 1 to 4.5. Minimally disabled athletes are classified as a 4.5, and an individual with the highest degree of disability (such as a paraplegic with a complete injury below the chest) would be classified as a 1.0. Competitions restrict the number of points

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allowable on the court at one time. The five players from each team on the court during play may not exceed a total of 14 points. In places where teams are integrated, non-disabled athletes compete as either a 4.5 in Canada or a 5.0 in Europe; however, non-disabled athletes are not allowed to compete internationally. Wheelchair Basketball is one of the leading sports for people with disabilities, allowing people of all ages to enjoy fast-paced competition and exercise in a team setting (Goosey, 2010).

### 3. Methodology

#### Selection of Subjects

The purpose of the study was to analysis the anthropometric characteristics of Indian Wheelchair Basketball Men Players with special reference to their sport class. To achieve the purpose of the study, Thirty - Two Men Wheelchair Basketball Players who were attending the Indian Wheelchair Coaching Camp during the year 2022 at Ramakrishna Mission Vidyalyaya, Venkataraman Indoor Stadium, Coimbatore, Tamilnadu. Their age ranged between 22 and 42 years. Proper informed context from coach and participants were obtained before conducting the research. According to their sport class the following 30 players were grouped into classifications.

Sport Class	Number of Subjects	Withdrawn
1	1	Yes
2	10	No
3	10	No
4.5	11	1
Total number of Sample		N = 30

Out of 32 subjects, 2 were withdrawn and 30 subjects were getting informed context. Further the sport class from 2 to 4.5 were selected as subjects for this study.

Table I: Variables and Test Items

S. No	Variables	Test Items	Unit of Measurement
1.	Standing height and	Seca portable stadiometer and	Centimeter and
2.	Body weight	Calibrated digital scale	Kilogram
3.	Playing Ability	Coaches Rating	Points

#### Research design and statistical techniques

Static group research design was used to evaluate the pre-stated hypothesis, as it test the significant mean differences exist between the sport class of three groups (n=10 each) among 30 Wheelchair Basketball players. Descriptive statistics of each criterion variables were computed. In all the cases, 0.05 level of significance was fixed. To evaluate the mean difference between the sport class of Wheelchair Basketball Players, Analysis of Variance (ANOVA) was computed. Statistical Package for Social Sciences (SPSS), 17<sup>th</sup> Version was utilized for all the statistical computation.

Table II: Descriptive Statistics of Sport Class among Indian Senior Men Wheelchair Basketball players on Height and Weight

	Class	N	Mean	Std. Deviation	Minimum	Maximum
Height	Sport Class - 2	10	70.67	1.504	68	72
	Sport Class - 3	10	74.57	2.018	72	78
	Sport Class - 4.5	10	82.11	1.021	81	84
Weight	Sport Class - 2	10	80.75	3.781	73	85
	Sport Class - 3	10	59.60	3.042	55	65
	Sport Class - 4.5	10	86.13	2.222	83	90

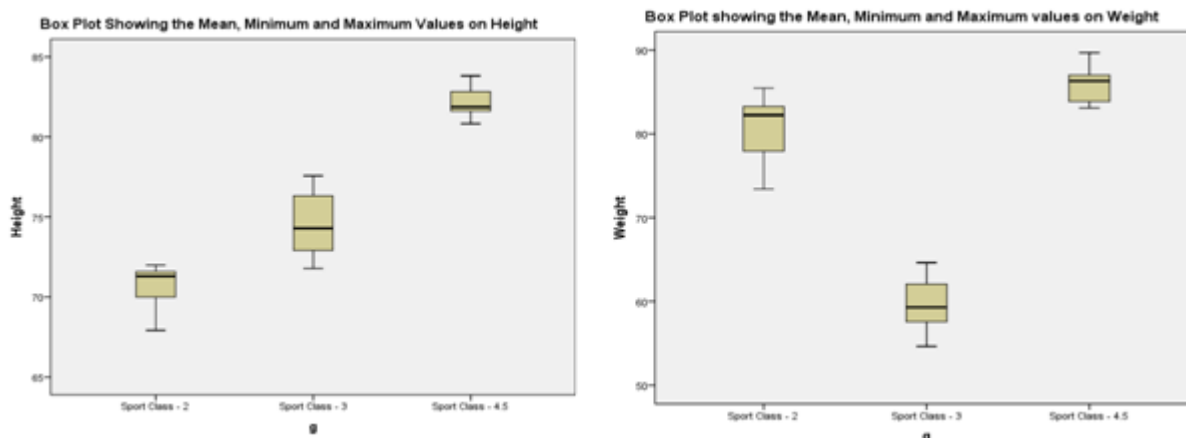


Figure 1: Box Plot of Height and Weight

From the above table – II, the Sitting Height was ranged between 68 to 84 with the mean 70.67 ( $\pm 1.5$ ) for sports class – 2; 74.57 ( $\pm 2.1$ ) for sport class – 3 and 82.11 ( $\pm 1.02$ ) for sport class 4.5 respectively. It revealed that there was a chance of low as well as greater height in terms of sitting stature. Further, an attempt was made to identify such classification in terms of weight. Among the sport class, the

weight controversially revealed that sport class 2 and 4.5 has greater weight (80.75,  $\pm 3.8$ ) (86.13,  $\pm 2.2$ ) than the sports class of 3 (59.60,  $\pm 3.04$ ).

Box plot ensures that there were no outliers exist on the three - sport class on Indian senior men wheelchair Basketball players in terms of height and weight.

**Table III:** Analysis of Variance between the Sport Class among the Indian Senior Men Wheelchair Basketball Players (n = 30) on Height and Weight Test of Homogeneity of Variances

Variables	Levene Statistic	df1	df2	Sig.
Height	3.238	2	27	.065
Weight	1.789	2	27	.186

Variables	Source	Sum of Squares	dDf	Mean Square	F	Sig.
Height	Between Groups	675.937	2	337.969	137.425*	.000
	Within Groups	66.401	27	2.459		
Weight	Between Groups	3934.696	2	1967.348	207.148*	.000
	Within Groups	256.428	27	9.497		

\*significant at 0.05 level (table value t (p < 0.05; 2, 27)) = 3.35)

From the table - III, test for homogeneity of variance was not significant that ensures the assumption for computing the Analysis of Variance (ANOVA) for Height and Weight were not violated. ANOVA table revealed that there was a significant mean different exists among three sport class of Indian Senior Men Wheelchair Basketball Players on Height and Weight. Since the obtained 'F' – value was greater than

the table value of 3.35 with degree of freedom (2, 27), there was a significant mean difference exists with their height and weight among the sport classes of Indian Senior Men Wheelchair Basketball Players. Since both height and weight are significant mean difference, Scheffee's Post hoc test was performed to find out which pair of mean difference was greater in the table - IV.

**Table IV:** Scheffee's Post hoc between the Sport Class among the Indian Senior Men Wheelchair Basketball Players (n = 30) on Height and Weight Scheffe

Variables	(I) g	(J) g	Mean Difference (I - J)	Std. Error	Sig.
Height	Sport Class - 2	Sport Class - 3	- 3.899*	.701	.000
		Sport Class - 4.5	- 11.436*	.701	.000
	Sport Class - 3	Sport Class - 2	3.899*	.701	.000
		Sport Class - 4.5	- 7.536*	.701	.000
	Sport Class - 4.5	Sport Class - 2	11.436*	.701	.000
		Sport Class - 3	7.536*	.701	.000
Weight	Sport Class - 2	Sport Class - 3	21.156*	1.378	.000
		Sport Class - 4.5	- 5.376*	1.378	.002
	Sport Class - 3	Sport Class - 2	- 21.156*	1.378	.000
		Sport Class - 4.5	- 26.532*	1.378	.000
	Sport Class - 4.5	Sport Class - 2	5.376*	1.378	.002
		Sport Class - 3	26.532*	1.378	.000

\*. The mean difference is significant at the 0.05 level.

The table – IV, revealed that the result of Scheffee's post hoc test among the three sport class of Indian Senior Men Wheelchair Basketball Players were significantly differed by pair of means on Height and Weight. In all the case of pair of mean difference, on Height and weight, pair of 4.5 versus 2 have greater differences, followed by 4.5 versus 3 and then 2 versus 3 sport classes.

**Table V:** Descriptive Statistics of Sport Class among Indian Senior Men Wheelchair Basketball players on Playing Ability

Sport Class	N	Mean	Std. Deviation	Minimum	Maximum
Sport Class - 2	10	66.85	1.810	64	70
Sport Class - 3	10	69.71	2.184	67	74
Sport Class - 4.5	10	72.72	2.339	69	78

From the above table – V, the Playing Ability was ranged between 64 to 78 with the mean 66.85 (±1.8) for sports class – 2; 69.71 (±2.18) for sport class – 3 and 72.72 (±2.34) for sport class 4.5 respectively. It revealed that there was a chance of low as well as greater playing ability in terms of their sport class.

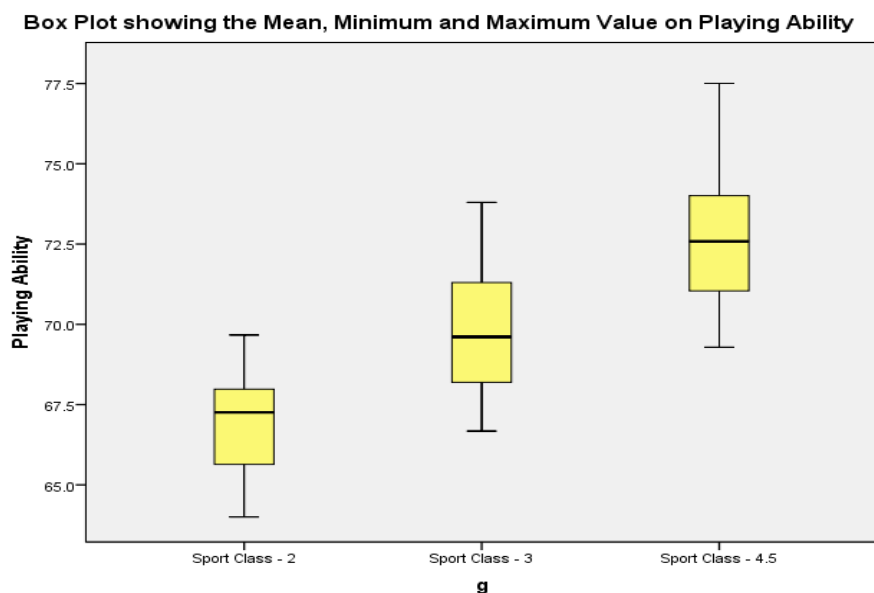


Figure 2: Box Plot of Playing Ability

Table VI: Analysis of Variance between the Sport Class among the Indian Senior Men Wheelchair Basketball Players (n = 30) on Height and Weight Test of Homogeneity of Variances

ANOVA					
Source	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	172.314	2	86.157	19.121	.000
Within Groups	121.66	27	4.506		

From the table - VI, test for homogeneity of variance was not significant that ensures the assumption for computing the analysis of variance (ANOVA) for playing ability was not

violated. ANOVA table revealed that there was a significant mean difference exists among three sport class of Indian senior men wheelchair Basketball players on playing ability. Since the obtained 'f' – value was greater than the table value of 3.35 with degree of freedom (2, 27), there was a significant mean difference exists with their playing ability among the sport classes of Indian senior men wheelchair Basketball players. Since playing ability was having significant mean difference, scheffe's post hoc test was performed to find out which pair of mean difference was greater in the table - VII.

Table VII: Scheffe's Post hoc between the Sport Class among the Indian Senior Men Wheelchair Basketball Players (n = 30) on Playing Ability Multiple Comparisons Dependent Variable: Playing Ability Scheffe

(I) g	(J) g	X Mean Difference (I - J)	Std. Error	Sig.
Sport Class - 2	Sport Class - 3	- 2.860*	.949	.020
	Sport Class - 4.5	- 5.870*	.949	.000
Sport Class - 3	Sport Class - 2	2.860*	.949	.020
	Sport Class - 4.5	- 3.010*	.949	.014
Sport Class - 4.5	Sport Class - 2	5.870*	.949	.000
	Sport Class - 3	3.010*	.949	.014

\*. The mean difference is significant at the 0.05 level.

The table – VII, revealed that the result of scheffe's post hoc test among the three sport class of Indian senior men wheelchair Basketball players were significantly differed by pair of means on playing ability. in all the case of pair of mean difference, on playing ability, pair of 4.5 versus 2 have greater differences, followed by 4.5 versus 3 and then 2 versus 3 sport classes.

#### 4. Discussion and Findings

The main objective of this study is the analysis the anthropometric characteristics and playing ability among elite Indian wheelchair basketball players. Stature has long been appreciated as a key body parameter in running basketball performance (Cormery et al., 2008). Study was stated that individuals dealing with sports are more

independent in terms of mobility in the daily life and have greater life quality compared to individuals who do not deal with sports, and that regular exercises of a disabled individual were important regarding the physical fitness (Hutzler et al., 1998, Wilhite et al., 2009 and Yazicioğlu et al., 2012)

Does a knowledge of anthropometric characteristics help to improve one's Basketball skills a question asked by peter Brancazio some 35 years ago still presents a considerable challenge and attracts active interest of current researchers. Anthropologist usually start their analysis from the structural pattern of players that provides a distinct advantage to play the game Basketball. Unlike other kinds of variables, it is pretty easy to measure the variables, since there is lot standardized equipment are available that make the things



easy. Nevertheless, despite all the modern knowledge, professional players only make 75% of bodily advantages. Many players show even less favorable statistics, such as shaquille o'neal, notorious for his greater height and weight that provide him a playing advantage. More recent NBA examples are Andre Drummond and Deandre Jordan hovering around greater height and weight.

But, not like the regular Basketball, wheelchair Basketball is somehow difficult to play. Due to its complexity of classification, the on court playing players themselves, they have huge differences on their disabilities. Despite their disability, there are four major classifications, namely, 1, 2, 3, 4.5 classifications. This study, from the analysis, this study revealed that the anthropometric characteristics were greatly influenced the wheelchair Basketball performance. There is always room for challenge at the moment getting into the court: the challenges are executing the fundamental skills. This study was only focusing on selected anthropometric characteristics and their playing ability. Regarding the classification of players, only 2, 3 and 4.5 sport class were taken into analysis. Comparing the mean values on selected criterion variables namely, standing height, weight, and playing ability. In all the cases, 4.5 sport class, dominates in terms of height and playing ability, followed by 3 and then the 2 - sport class. The same finding was in accordance with the **Vaughn, 1993**. As the role played by each sport class is entirely different than the other (**Hartley & Fulton, 1971**). As per the results of the analysis, the all the three classifications, the playing ability is not same. The structure prevailing the specific playing positions were also determined by anthropometric characteristics. The pair of mean difference were also having greater difference between the sports class – 4.5 versus 2, followed by 4.5 versus 3 and then 2 versus 3 (**Vaughn, 1993**).

## 5. Conclusion

Form the analysis of results of the study, the following conclusions were drawn.

- 1) Among the sport class, 4.5 classification have dominated in all the selected anthropometric characteristics of Indian senior men wheelchair Basketball players.
- 2) The role played by each sport class is not same and the structure provides distinct advantage among Indian senior men wheelchair Basketball players.
- 3) The playing ability of the distinct sport class 4.5 has due weightage than the other sport class in terms of performance.

## References

- [1] **Cavedon, V., Zancanaro, C., and Milanese, C.** (2015). Physique and performance of young wheelchair basketball players in relation with classification. *PLoS One* 10: e0143621. doi: 10.1371/journal.pone.0143621. [Google scholar], <https://doi.org/10.1371/journal.pone.0143621>.
- [2] **Chapman, D, Fulton, S, and Gough, C.** Anthropometric and physical performance characteristics of elite male wheelchair basketball athletes. *J Strength Cond Res* 24: 1, 2010. <https://journals.lww.com/doi/10.1097/01.JSC.0000367081.53188.ba>
- [3] **Echeverría, N., Moratorio, G., Cristina, J., and Moreno, P.** (2015) Hepatitis C virus genetic variability and evolution. *World journal of hepatology*, 7 (6), Pp 831. [Google scholar]
- [4] **Gómez, M. A., Molik, B., Morgulec - Adamowicz, N., and Szyman, R.** (2015). Performance analysis of elite women's wheelchair basketball players according to team - strength, playing - time and players' classification. *Int. J. Perform. Anal. Sport* 15, 268–283. [Tylor & Francis online]
- [5] <https://doi.org/10.1080/24748668.2015.11868792>
- [6] **Gómez, M. A., Pérez, J., Molik, B., Szyman, R. J., and Sampaio, J.** (2014). Performance analysis of elite men's and women's wheelchair basketball teams. *J. Sports Sci.*32, 1066–1075. [Tylor & Francis online] <https://doi.org/10.1080/02640414.2013.879334>
- [7] **Hutzler, Y.; Ochana, S.; Bolotin, R.; Kalina, E.** Aerobic and anaerobic arm - cranking power outputs of males with lower limb impairments: Relationship with sport participation intensity, age, impairment and functional classification. *Spinal Cord* 1998, 36, 205–212. [Google scholar], [CroosRef].
- [8] <https://doi.org/10.1038/sj.sc.3100627>
- [9] International Paralympic Committee. IPC classification code and international standards. Bonn: International Paralympic Committee.2007. Available: [http://www.paralympic.org/sites/default/files/document/120201084329386\\_2008\\_2\\_Classification\\_Code6.pdf](http://www.paralympic.org/sites/default/files/document/120201084329386_2008_2_Classification_Code6.pdf). [Accessed on 25/04/2023].
- [10] **McIntosh, R., Vaughn, S., Schumm, J. S., Haager, D., & Lee, O.** (1993) Observations of students with learning disabilities in general education classrooms. *Exceptional children*, 60 (3), Pp 249 - 261. [Google scholar], <https://doi.org/10.1177/00144029940600>
- [11] **Wilhite, B.; Shank, J.** In praise of sport: Promoting sport participation as a mechanism of health among persons with a disability. *Disabil. Health J.*2009, 2, 116–127. <https://doi.org/10.1016/j.dhjo.2009.01.002>, [Google Scholar],
- [12] **Yazicioğlu, K.; Yavuz, F.; Göktepe, A. S.; Tan, A. K.** Influence of adapted sports on quality of life and life satisfaction in sport participants and non - sport participants with physical disabilities. *Disabil. Health J.*2012, 5, 249–253. <https://doi.org/10.1016/j.dhjo.2012.05.003>
- [13] Croft, L, Dybrus, S, Lenton, J, and Goosey - Tolfrey, VA. Comparison of the physiological demands of wheelchair basketball and wheelchair tennis. *Int J Sports Phys Perform* 5: 301–315, 2010. [Google Scholar], <https://doi.org/10.1123/ijsp.5.3.301>
- [14] International Wheelchair Basketball Federation, IWBF. History of the game [Online]. Available at: <https://iwbf.org/2018/08/08/history-in-the-making-for-morocco-men/> [Accessed on 25/04/2023].
- [15] Goosey - Tolfrey, VL and Leicht, CA. Field - based physiological testing of wheelchair athletes. *Sports Med* 43: 77–91, 2013. <https://doi.org/10.1007/s40279-012-0009-6>, [Google Scholar]
- [16] Molik, B, Laskin, J, Kosmol, A, Skucas, K, and Bida, U. Relationship between functional classification

levels and anaerobic performance of wheelchair basketball athletes. *Res Q Exerc Sport* 81: 69–73, 2010. <https://doi.org/10.1080/02701367.2010.10599629>, [Google Scholar]

- [17] Doll - Tepper, Gudrun; Kröner, Michael; Sonnenschein, Werner; International Paralympic Committee, Sport Science Committee (2001). "Organisation and Administration of the Classification Process for the Paralympics". *New Horizons in sport for athletes with a disability: proceedings of the International VISTA '99 Conference, Cologne, Germany, 28 August - 1 September 1999. Vol.1.* Oxford (UK): Meyer & Meyer Sport. pp.379–392. ISBN 1841260363. OCLC 48404898.
- [18] Goosey - Tolfrey, Vicky (2010). *Wheelchair sport: a complete guide for athletes, coaches, and teachers.* Champaign, Illinois: Human Kinetics. pp.16–18. ISBN 9780736086769. OCLC 489446056. [Google Scholar]
- [19] Bhambhani Y. Physiology of wheelchair racing in athletes with spinal cord injury. *Sports Med.*2002; 32: 23–51. <https://doi.org/10.2165/00007256-200232010-00002>, [Google Scholar]
- [20] [https://www.physiopedia.com/Adaptive\\_Sport?utm\\_source=physiopedia&utm\\_medium=related\\_articles&utm\\_campaign=ongoing\\_int\\_ernal](https://www.physiopedia.com/Adaptive_Sport?utm_source=physiopedia&utm_medium=related_articles&utm_campaign=ongoing_int_ernal) [Accessed on 25/04/2023].