

Peer Review File

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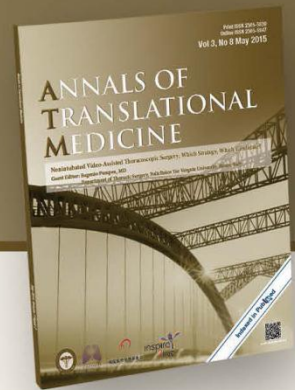
Reviewer

The paper titled “A novel prophylactic Chinese parachute ankle brace CPAB” is interesting. The CPAB was more effective at restricting ankle joint motion on the coronal and sagittal planes than the other two prophylactic ankle braces. Therefore, the CPAB had the advantages of a novel appearance, high efficiency, and superior comfort, providing a reliable choice for parachute jumping and training in China. However, there are several minor issues that if addressed would significantly improve the manuscript.

1) Has this study been submitted to Military Medical Research? Why is the full text available for download and the content is almost the same as this article?

Reply 1: We thank the reviewer for this concern. We had submitted our manuscript to the journal of *Military Medical Research* before. As shown below, this journal editorial office rejected our paper on 13 May, 2020. After that, we revised and polished up our manuscript, then submit it to the *ATM* journal.

Thus, if the full text can be downloaded or seen online, we must accuse the *Military Medical Research* editor board of concealing our authors and revealing our manuscript.



Date: 13 May 2020
To: "Yong Liu" liuyongpumc@163.com
From: "Military Medical Research Editorial Office" Jhoan.Flores@springernature.com
Subject: Decision on your submission to Military Medical Research - MMRJ-D-20-00188

MMRJ-D-20-00188
A novel prophylactic parachute ankle brace CPAB
Xi Zhou; Di Wu; Zhengyao Li; Xiangdong Wu; Bin Yan; Leilei Liang; Yu He; Yong Liu
Military Medical Research

Dear Dr. Liu,

Thank you for submitting your manuscript, "A novel prophylactic parachute ankle brace CPAB" (MMRJ-D-20-00188) to Military Medical Research. Although we think that you address an important topic, we regret to have to tell you that we cannot consider it for publication in the journal.

We are currently excluding at an early stage those papers, which we feel will be better placed elsewhere and we believe this to be the case with your manuscript. As it stands, we prefer to return the paper to you now, in order that you can submit elsewhere.

We are sorry that we cannot accept the paper and hope you will be successful in finding publication elsewhere.

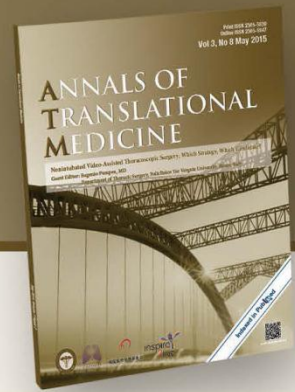
Yours sincerely,

Xiao-Bing Fu, MD
Military Medical Research
<https://mmrjournal.biomedcentral.com/>

2)What is the impact of CPAB on subjects' subjective feelings?

Reply 2: We thank the reviewer for this question. All subjects were briefly asked the same questions (Constructs of subjective factors) after participation, including questions regarding ease of use, quality, comfort, stability, hindrance, and satisfaction. The multiple 5-point Likert scale (below figures) was evaluated by the subjects with 5 being the best and 1 being the worst.

1分	2分	3分	4分	5分
Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree
强烈反对	有点反对	既不反对也不赞同	有点赞同	强烈赞同



踝关节防护装置赋分表

请您从以下几个方面为弹性护踝，半刚性护踝，新型踝关节防护装置 CPAB 赋分。5 分制 (multiple 5-point Likert-scale)，5 分为最优，1 分为最差。

- 一、Use 易用性：清楚必须装备/明确如何使用/了解装备工作原理。
- 二、Quality 质量：装备看起来有吸引力/装备的材料好。
- 三、Comfort 舒适度：静止状态下穿戴舒服/运动状态下穿戴舒服/装备适合相关关节/我并没有感觉到佩戴了装备/运动过程中装备未移位/静止状态下穿戴疼痛，不舒服/特定运动状态下穿戴疼痛，不舒服。
- 四、Stability 稳定性：装备给关节提供了足够的支撑、保护/运动状态下穿戴装备，我的关节感觉到了稳定感/和不穿戴装备相比，我的关节感到更加稳定感。
- 五、Hindrance 阻碍性：穿戴防护装备使关节活动不灵活，活动度降低。
- 六、Satisfaction 满意度：穿戴防护装备让我感到安全感/我鼓励其他战友使用/我讨厌穿戴防护装备/我认为防护装备适用于跳伞或训练/如果受伤，穿戴防护装备情况下我的受伤问题就会少一些。

评价指标(Variable)	弹性护踝	半刚性护踝	CPAB
易用性 (Ease of use)			
质量 (Quality)			
舒适度 (Comfort)			
稳定性 (Stability)			
阻碍性 (Hindrance)			
满意度 (Satisfaction)			
总分 (total scores)			

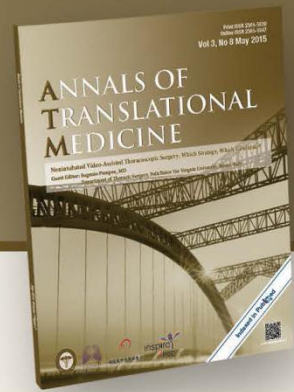
[Considering the level of education among the paratroopers, the 5-point Likert scale and Constructs of subjective factors were bilingual]

The results (Table 4) showed 85% of the subjects agreed that CPAB restricted inversion and eversion more effectively than the elastic brace, and was more comfortable and soft than the semi-rigid ankle brace.

3)The number of samples in this study is too small, and large sample studies should be added for verification.

Reply 3: We thank the concerns raised by the reviewer. As we set the strict inclusion criteria, not only the age, weight, height, but also other request, such as the subjects were “with formal parachute landing training and over 2 yr of parachute jumping experience; had no history of lower extremity trauma or spinal fractures; had no history of previous surgery of the lower extremities, neurological or joint degenerative diseases, or vestibular or visual disturbances”.

Finally, there were only 20 elite male paratroopers in our experiment. Although the number of



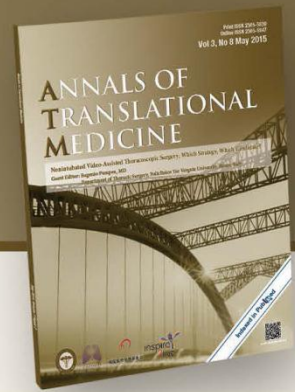
the subjects was not large, but every participant wore no brace or elastic brace or semi-rigid brace or CPAB, then jumped off the platform with three different heights (low: 40 cm, medium: 80 cm, and high: 120 cm) respectively. And each subject underwent five trials under each condition. So every participant test $4 \times 3 \times 5 = 60$ trials and the times of parachute landing in the whole experiment was $60 \times 20 = 1200$. There's no doubt the number of samples is very large as we had 1200 sets of data.

4) What are the shortcomings of this research? How to improve?

Reply 4: We agree and thank the reviewer for great concerns. We added the shortcomings and prospects of this research at the end of the Discussion section. In the biomechanical experiments, each subject was required to complete HSPL at different platform heights with different protective braces, and at least 5 trials should be completed. Frequent landing actions would cause muscle fatigue and errors. We had considered this deficiency and improve the process, as we mentioned in the Method section, "Any fatigue effects were mitigated by resting for at least a 60 s interval between landings under each condition."

Changes in the text: Our research also had some shortcomings: (1) the biomechanical experiment was based on the conclusion of our previous studies, although wearing elastic and semi-rigid ankle braces both had no significant effect on the extorsion and intorsion of ankle joint, whether CPAB also had no significant limitation on the lateral rotation motion of ankle joint remained to be proved. (2) According to the known holistic synergy theory of the lower extremity, whether the restriction of the ankle joint increased the energy consumption or injury of the knee and hip joint remained to be further explored.

CPAB, as an ankle brace for parachuting, was still preliminary, and it would sustain external forces, including huge GRF at the moment of landing and continuous small stress or strain at all directions. Therefore, the CPAB should have good mechanical properties which need to be tested in the future research, including the shaping test, tensile test, anti-fatigue test, fabric permeability test and fabric friction test, etc. (see Page 17, line 7-19)



5)The introduction is too simple. The influencing factors of parachuting injuries and ankle joint injuries of paratroopers, the classification and limitations of existing ankle joint protection products should be added.

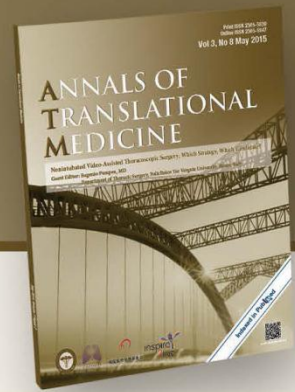
Reply 5: We thank the reviewer for these good suggestions. We added the causes of ankle injury as request, while, we had the classification and limitations of existing ankle joint protection products in the second paragraph in the Introduction section (from “according to the application method and appearance design” to “is rare currently”).

Changes in the text: The causes of ankle injury during parachute landing are complex. Ekland conducted a retrospective analysis of 4499 parachuting landing injuries and found that about 71% of injuries were caused by an incorrect landing posture (2). According to the investigation conducted by Dhar on 150 hospitalized patients with parachuting injuries, 53% of the parachuting injuries occurred during the landing stage, which were caused by inappropriate landing methods, and other influencing factors included improper cabin exit, uneven ground, windy weather, and inappropriate parachuting operation (3). (see Page 3, line 13-20)

6)What is the impact of CPAB on the biomechanics of the ankle joint? What is the significance of the research?

Reply 6: We thank the review for these comments. The CPAB more markedly restricted the motion of the ankle joint on the coronal and sagittal planes than the elastic and semi-rigid ankle braces. To be specific, as the results of biomechanical data (Peak vGRF, T-PvGRF, MEM, MPM, MDAD, MDAV, MIAD, MIAV, work and maximum power) showed, wearing CPAB could provide greater inversion and dorsiflexion limitations, reduce the amount of work and power, and enjoy greater comfort.

Our research aimed to design a built-in ankle brace for Chinese paratroopers, which can effectively limit the inversion and dorsiflexion of ankle joint, reduce GRF, and improve its comfort, flexibility and convenience, so as to reduce and prevent the ankle injury caused by paratrooper military training and jumping. Because most studies of parachute landing injury of the ankle joint mainly focused on epidemiological investigations, cadaver modeling systems,



and primitive kinematic/kinetic studies, the significance of biomechanical test was vital, since it supplied the support of strict mechanical experimental data and a professional theoretical basis.

7)The discussion part should increase the deficiencies and prospects of this research.

Reply 7: We agree and thank the reviewer for great concerns. We add the shortcomings and prospects of this research at the end of the Discussion section. It was shown in the Reply 4 above. (see Page 3, line 13-20)