

## ***Analysis on the effect of ultra-endurance run on the upper respiratory symptom status among the super veteran recreational runners***

***Rajender Kommu,<sup>1</sup> Venkata Rajasekhar Kali<sup>2</sup>, Gopikrishna Yarlagadda<sup>3</sup>***

***Research scholar, JNT University, Hyderabad<sup>1</sup>, Director of Physical Education, University of Hyderabad, India<sup>2</sup>, Professor in Physical Education, JNT University, Hyderabad<sup>3</sup>.***

---

***Abstract:*** Running may be a beneficial method of enhancing the immune physiology, but there are some concerns on the effects of high intensity and sustained physical activities like marathon running on the immune physiology, especially among the veteran and aged recreational runners. Since aging also enhances the degenerative aspects of the immune physiology, it is important to note whether there are any negative issues that may arise due to the marathon running among the super veteran recreational runners. Forty super veteran male recreational runners were studied, with respect to their Upper Respiratory Tract Infection status through the WURSS-44 survey, pre and post their marathon running. Analysis of Variance (ANOVA) at 0.05 level of significance indicated that there is significant difference ( $F$  of 18.97 at  $P$  value of 0.00048) between their pre marathon running URTI scores and their post marathon symptom scores even up to seventh day. It may be concluded that the super veteran recreational runners may be prone for temporary suppressed upper respiratory tract immune status causing significant URTI symptoms for many days after the marathon running.

***Key words:*** Recreational running, Ultra-endurance running, marathon running, inflammatory stress.

***Introduction:*** The passion of running is bringing in more and more city marathons and ultra-marathons. The participation of recreational runners in these marathons is increasing exponentially during the recent times. Though moderate exercise has been recognised as a positive tool for the functional health of the individuals, the effects of ultra-endurance activities are not studied much. Especially, the effect of ultra-running on recreational runners, and more specifically on the veteran and super veteran runners need to be studied more extensively on scientific lines<sup>7</sup>. Recreational runners training protocols are not clearly devised and implemented with the most of the runners, as the training protocols of these runners depends mostly on their regular work schedules and their other lifestyle issues. The training aspects of the professional and regular athletes are entirely different from that of the recreational runners. Due to several compromises during the training of the recreational runners, it is very important that these recreational runners, especially the veteran and super veteran runners need to be more cautious while participating in such ultra-endurance activities like marathon running<sup>9</sup>. Intensity of the running may be linked to the response of the heart during the physical activity and generally, the super veteran runners who are above the age of 55 years might experience high intensity while they run the ultra-distance running including half marathon running. Higher intensity sustained aerobic activities may induce higher levels of inflammatory and oxidative stress upon the veteran recreational runners inducing severe physiological

stress<sup>10</sup>. The super veteran recreational runners have to adapt s proper scientific training program, which may also include the proper rest and recovery methods. Even the participation into such marathon events should be done in a phased manner, slowly adapting to shorter running events to the longer running events. Proper recovery methods should also include proper nutrition strategies that would provide with sufficient anti-inflammatory and anti-oxidative nutrients.

Exercise immunology studies are suggesting that, that the respiratory tract may be prone for severe and sometimes uncontrolled inflammatory and oxidative stress during the sustained marathon running activities. This may happen even among the well trained and elite marathon runners due to several reasons that prevail at that particular time of marathon running, which may include the environmental conditions, nutritional deficiencies, intensity prone issues and several such things. This physiological stress during the sustained physical activities may cause for respiratory tract immune suppression conditions because of the negative impact of this stress upon the epithelial tissues of the respiratory tract including the mucus membranes of the respiratory system<sup>1</sup>. Several studies indicated that there may be temporary suppression of respiratory immunity, especially the upper respiratory tract immunity<sup>5</sup>, which may foster for the enhanced infection conditions<sup>3</sup>. Gross disturbances in the upper respiratory tract epithelial tissues could foster for such conditions, during which the veteran runners might experience some infection symptoms post their ultra-endurance running activities<sup>6</sup>. Hence, it is important to study the effect of marathon running including the half marathon running upon the respiratory immunity of the veteran and super veteran recreational runners. In this study, it is envisaged to understand the effect of the half marathon and marathon running upon the upper respiratory symptoms of the super veteran runners, who participated in various marathon running events in and around Hyderabad city of India.

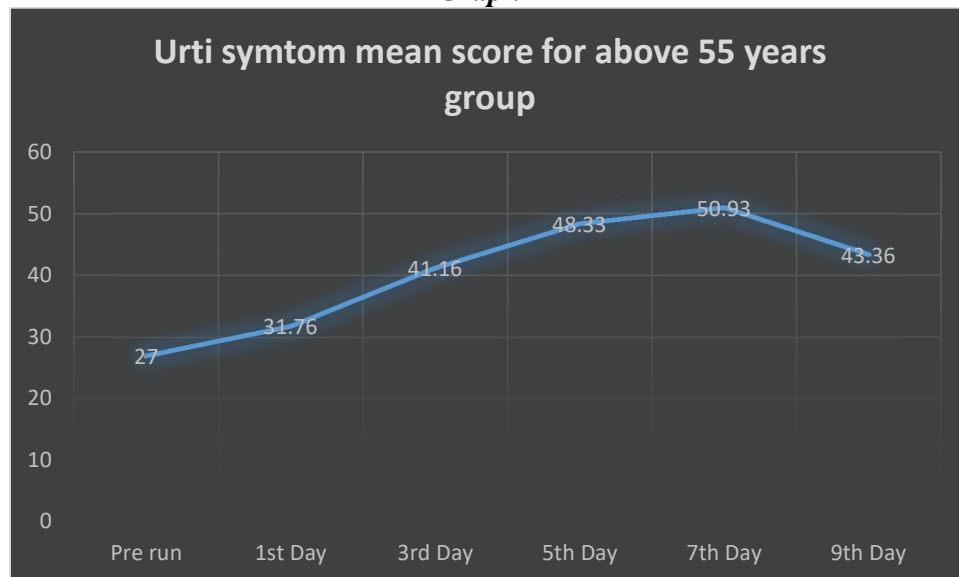
**Methodology:** The study was envisaged to understand the effect of the marathon running on the Upper Respiratory Tract Symptoms status of the super veteran recreational marathon runners through measuring the Upper Respiratory Tract Infection symptom score (URTI score). For this, a total of forty recreational marathon runners were included for the study in the age group of senior veterans, above 55 years but not over than sixty-five years. The recreational runners were approached during the Airtel Hyderabad marathon and University of Hyderabad half marathon events and the consent from the individual runners were obtained after explaining the whole procedure. The runners were tested on their URTI symptom score through using the Wisconsin Upper Respiratory Symptoms Survey – 44 (WURSS-44) questionnaire<sup>8</sup>, just one day before and then after twenty-four hours and up to ninth day, daily early in the morning. Hence, one pretest URTI score and five post marathons running URTI scores were noted. Analysis of variance (ANOVA) was applied to understand the day-to-day variations in the values of the URTI symptom scores of the recreational runners' groups at a significant level of 0.05. Appropriate post hoc considerations (Tukey's HSD) were also done after the variance analysis.

**Analysis of variance (ANOVA) for URTI symptom scores for the 55 years above recreational running group of the study:** The mean analysis in table I indicates that 55 years above recreational running group experienced significant increases in their URTI symptom scores post their acute marathon running event effort over the first seven days before experiencing some recovery in their URTI symptom scores. Analysis of Variance

**Table I. URTI mean values for the 55 years above running group**

Treatment →	Pre run	1st Day	3rd Day	5th Day	7th Day	9th Day
observations N	30	30	30	30	30	30
mean $\bar{XX}$	27.00	31.76	41.16	48.33	50.93	43.36
std. dev.	1.34	1.54	2.25	2.42	2.76	2.20

**Graph I**



as indicated in table II that the obtained F statistic of one-way ANOVA of 18.97 is significantly high and the P value was at 0.004, suggesting that the URTI scores are significantly different, hence the Tukey's HSD post hoc comparison test was done to find out the source of the significant difference (Table III).

**Table II. ANOVA for URTI symptom score for 55 yrs above group**

source	sum of squares SS	degrees of freedom vv	mean square MS	F statistic	p-value
treatment	13,121.02	5	2,624.20	18.97	4.8850e-15
error	24,061.03	174	138.28		
total	37,182.06	179			

**Table III. Tukey's HSD Q critical: at 6 and 174 df at 0.05 level: 4.0754**

treatments pair	Tukey HSD Q statistic	Tukey HSD p-value	Tukey HSD inference
<b>A vs B</b>	2.2202	0.6033231	insignificant
<b>A vs C</b>	6.5985	0.0010053	** p<0.01
<b>A vs D</b>	9.9366	0.0010053	** p<0.01
<b>A vs E</b>	11.1476	0.0010053	** p<0.01
<b>A vs F</b>	7.6232	0.0010053	** p<0.01
<b>B vs C</b>	4.3783	0.0272852	* p<0.05
<b>B vs D</b>	7.7164	0.0010053	** p<0.01
<b>B vs E</b>	8.9274	0.0010053	** p<0.01
<b>B vs F</b>	5.4030	0.0025185	** p<0.01
<b>C vs D</b>	3.3381	0.1760319	insignificant
<b>C vs E</b>	4.5491	0.0189893	* p<0.05
<b>C vs F</b>	1.0247	0.8999947	insignificant
<b>D vs E</b>	1.2110	0.8999947	insignificant
<b>D vs F</b>	2.3134	0.5656075	insignificant
<b>E vs F</b>	3.5244	0.1317963	insignificant

\* A=Pre run, B=1 day after run, C= 3 days after, D=5 days after, E=7 days after, F=9 days after

The tukey's HSD comparisons revealed that there is significant difference in the URTI symptom scores between the pre marathon run and the third day, fifth day, seventh day and ninth day post marathon URTI symptom scores. There is significant difference even between the second day URTI symptom scores and the third day, fifth day and seventh

day URTI symptom scores of the veteran running group. There is also significant difference between the fifty day after the marathon running URTI score and the seventh day after the marathon running event URTI symptom scores.

**Discussion on results:** The results are clearly indicating that the super veteran recreational runners are experiencing severe URTI symptoms post their marathon running performance. The group experienced significant increases in their URTI symptom scores even after the fifth day, but experiencing some respite only after seven days. This may be an indication of unnoticed infections that may be due to the compromises in their upper respiratory tract as a result of the severe inflammatory and oxidative stress they had experienced during the ultra-endurance marathon running at their elite age<sup>2</sup>. Moreover, the veteran recreational running group also experienced significant and continuous increases in their URTI symptom scores, despite the rest and recovery methods they adopted after their marathon effort. This significant increases in their URTI symptom scores after their marathon running may be also attributed for their age, as the aging may enhance the negative effects of the inflammatory stress due to reduced functional physiology in the aged. However, it is important to note that the high intensity sustained marathon running participation may enhance the immune suppression of the upper respiratory tract among the aged recreational runners and hence adaption of scientific methods of training and recovery is essential for such recreational runners<sup>4</sup>.

**Conclusions:** It may be concluded that the veteran recreational runners may experience negative effects on the upper respiratory tract immunity because of the severe exposure to the high levels of inflammatory and oxidative stress during the marathon running, leading to the increased upper respiratory tract infection symptoms.

### **References:**

1. Araneda, O. F., Carbonell, T., & Tuesta, M. (2016). Update on the Mechanisms of Pulmonary Inflammation and Oxidative Imbalance Induced by Exercise. *Oxidative medicine and cellular longevity*, 2016, 4868536. <https://doi.org/10.1155/2016/4868536>.
2. Barros, E. S., Nascimento, D. C., Prestes, J., Nóbrega, O. T., Córdova, C., Sousa, F., & Boullosa, D. A. (2017). Acute and Chronic Effects of Endurance Running on Inflammatory Markers: A Systematic Review. *Frontiers in physiology*, 8, 779. <https://doi.org/10.3389/fphys.2017.00779>.
3. Chimenti L, Morici G, Paternò A, Santagata R, Bonanno A, Profita M, Riccobono L, Bellia V, Bonsignore MR. Bronchial epithelial damage after a half-marathon in nonasthmatic amateur runners. *Am J Physiol Lung Cell Mol Physiol*. 2010 Jun;298(6): L857-62. doi: 10.1152/ajplung.00053.2010. Epub 2010 Apr 2. PMID: 20363849.
4. García-Pinillos F, Soto-Hermoso VM, Latorre-Román PA. How does high-intensity intermittent training affect recreational endurance runners? Acute and chronic adaptations: A systematic review. *J Sport Health Sci*. 2017 Mar;6(1):54-67. doi: 10.1016/j.jshs.2016.08.010. Epub 2016 Aug 31. PMID: 30356547; PMCID: PMC6188912.

5. Ihalainen JK, Schumann M, Häkkinen K, Mero AA. Mucosal immunity and upper respiratory tract symptoms in recreational endurance runners. *Appl Physiol Nutr Metab.* 2016 Jan;41(1):96-102. doi: 10.1139/apnm-2015-0242. Epub 2015 Oct13. PMID: 26701121.

6. Knechtle B, Nikolaidis PT. Physiology and Pathophysiology in Ultra-Marathon Running. *Front Physiol.* 2018 Jun 1; 9:634. doi: 10.3389/fphys.2018.00634. PMID: 29910741; PMCID: PMC5992463.

7. Mrakic-Sposta S, Gussoni M, Moretti S, Pratali L, Giardini G, Tacchini P, Dellanoce C, Tonacci A, Mastorci F, Borghini A, Montorsi M, Vezzoli A. Effects of Mountain Ultra-Marathon Running on ROS Production and Oxidative Damage by Micro-Invasive Analytic Techniques. *PLoS One.* 2015 Nov 5;10(11):e0141780. doi: 10.1371/journal.pone.0141780. PMID: 26540518; PMCID: PMC4634988.

8. Price OJ, Hull JH, Ansley L, Thomas M, Eyles C. Exercise-induced bronchoconstriction in athletes - A qualitative assessment of symptom perception. *Respir Med.* 2016 Nov; 120:36-43. doi: 10.1016/j.rmed.2016.09.017. Epub 2016 Sep25. PMID: 27817814.

9. Rodriguez Bauza DE, Silveyra P. Sex Differences in Exercise-Induced Bronchoconstriction in Athletes: A Systematic Review and Meta-Analysis. *Int J Environ Res Public Health.* 2020 Oct 5; 17(19):7270. doi: 10.3390/ijerph17197270. PMID: 33027929; PMCID: PMC7579110.

10. Taherkhani S, Suzuki K, Castell L. A Short Overview of Changes in Inflammatory Cytokines and Oxidative Stress in Response to Physical Activity and Antioxidant Supplementation. *Antioxidants (Basel).* 2020 Sep 18; 9(9):886. Doi:10.3390/antiox9090886. PMID: 32962110; PMCID: PMC7555806.

§§§§§§§§§§

Corresponding author:

Dr. Venkata Rajasekhar Kali, Ph,D  
Director of Physical Education and sports,  
University of Hyderabad, India.