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Thermal enhancement effect on chemo-radiation of glioblastoma multiform

S.R. Mahdavi¹, L. Khalafi^{2*}, A.R. Nikoofar³, P. Fadavi³,
F. Arbabi Kalateh⁴, T. Aryafar⁵, H. Foudazi⁶, B. Mofid⁷, G. Sharifi⁸,
S. Shivaliloo², H. Abdollahi²

¹Radiation Biology Research Center, and Department of Medical Physics, Iran University of Medical Sciences, Tehran, Iran

²Department of Medical Physics, School of Medicine (International Campus), Iran University of Medical Sciences, Tehran, Iran

³Department of Radiation Oncology, Iran University of Medical Sciences, Tehran, Iran

⁴Roshana radiotherapy and Oncology Center, Tehran, Iran

⁵Department of Medical Physics and Biomedical Engineering, Tehran University of Medical Sciences (International Campus), Tehran, Iran

⁶Omid Radiation Oncology Clinics, Tehran, Iran

⁷Department of Radiation and Oncology, Shahid Beheshti University of Medical Sciences, Tehran, Iran

⁸Department of Neurosurgery, Loghman Hakim Medical Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

ABSTRACT

Background: Hyperthermia plays a significant role in the chemo-radiotherapy effect in different malignancies. In this research, we treated Glioblastoma multiform (GBM) patients with hyperthermia (HT) along with the chemoradiation, in order to evaluate HT efficacy in terms of tumor volume changes, survival time, and probability. **Materials and Methods:** Thirty-eight GBM patients were distributed into two groups identified as chemoradiation (CRT), and also CRT plus HT (CRHT). The Karnofsky Performance Status Scale (KPS) was done before, immediately and three months after treatments. Capacitive hyperthermia device was used at frequency of 13.56 MHz (Celsius 42+ GmbH, Germany) for HT one hour before the radiotherapy for 10-12 sessions. Patients in both groups underwent MR imaging (1.5 Tesla) before, 3 and 6 months after the treatments. Thermal enhancement factors (TEF) were attained in terms of clinical target volume changes, $TEF(CTV)$, and survival probability (SP) or $TEF(SP)$. **Results:** Age ranges were from 27-73 years (Mean=50) and 27-65 years (Mean=50) for CRT and CRHT groups, respectively. For 53% and 47% of cases biopsy and partial resection were accomplished in both groups, respectively. Means and standard deviations of tumor volumes were 135.42 ± 92.5 and $58.4 \pm 104.1 \text{ cm}^3$ before treatment in CRT and CRHT groups, respectively, with no significant difference ($P=0.2$). $TEF(CTV)$ value was attained to be as 1.54 and 1.70 for three and six months after treatments, respectively, $TEF(SP)$ was also equal to the 1.90. **Conclusion:** HT enhanced the chemoradiation effects throughout the patient survival probability and KPS. TEF may reflect the hyperthermia efficacy for a given radiation dose.

Keywords: Hyperthermia, GBM, chemoradiotherapy, thermal enhancement factor.

► Original article

***Corresponding authors:**

Dr. Leila Khalafi,

E-mail:

khalafi57@yahoo.com

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