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The effect of *Zataria multiflora* and its constituent, carvacrol, on tracheal responsiveness and lung pathology in guinea pig model of COPD

Mohammad Hossien Boskabady*, Lila Gholami Mahtaj and Nima Mohamadian Roshan
Neurogenic Inflammation Research Centre, Mashhad University of Medical Sciences, Iran

Chronic obstructive pulmonary disease (COPD) is a progressive lung inflammation disease, mainly due to cigarette smoking. Anti-inflammatory property of *Zataria multiflora* (*Z. multiflora*) and its constituent, carvacrol was shown in various inflammatory disorders previously. Therefore, in present study, the effects of Zataria multiflora (*Z. multiflora*) and its constituent, carvacrol, in guinea pigs model of Chronic obstructive pulmonary disease (COPD) were examined. Animals were divided into; control, COPD, COPD + drinking water containing three concentrations of extract of *Z. multiflora* (0.4, 0.8 and 1.6 mg/ml), COPD + drinking water containing three concentrations of carvacrol (60, 120 and 240 µg/ml) and COPD + dexamethasone (50 µg/ml). COPD was induced by exposing animals to cigarette smoke for 3 months. Emphysema as a pathological change of the lung and tracheal responsiveness were measured (n=5 for control and COPD groups and n=6 for another groups). Tracheal responsiveness ($p<0.05$) and emphysema were significantly increased ($p<0.001$) in COPD compared to the control group. Tracheal responsiveness in COPD groups treated with two higher concentrations of the *Z. multiflora* and three concentrations of carvacrol, and emphysema in treated with highest concentration of *Z. multiflora* and carvacrol were significantly improved compared to COPD group. Studied parameters were also significantly improved in the treated group with dexamethasone compared to COPD animals ($p<0.05$ to $p<0.01$). The results indicated a preventive effect of *Z. multiflora* extract and its constituent, carvacrol on tracheal responsiveness and pathological changes of the lung.

boskabadymh@mums.ac.ir

Immunoneutralization of gonadotrophin releasing hormone (GnRH-I) by using a plasmid DNA vaccine coding GnRH-I can be a potential candidate to supress fertility in mammals

Umme K. Rima[a], Tadashi Kimura[b], Valerie A. Ferro[c], Mohammad T. Islam[d], Abu S.M. Bari[e] and Mohammad A. H. Khan[e]
[a]Danesh Science and Technology University (HSTU), Bangladesh
[b]Osaka University Graduate School of Medicine, Japan
[c]University of Strathclyde, Glasgow G4 ORE, UK
[d]Bangabandhu Seikh Mujibur Rahman Agricultural University, Bangladesh
[e]Bangladesh Agricultural University, Bangladesh

Immunoneutralization of GnRH-I is beneficial to suppress fertility in vivo. To achieve this, we have engineered a plasmid DNA vaccine coding eight repeats of GnRH-I peptide. Here the key focus was to stimulate Th-2 response and enhance immunity by vector incorporation. Sexually mature Swiss albino male and female mice (four in each group) were immunized with 50µg plasmid DNA vaccine in study week 0, 3, 6, 9 and 12. Group 2 female and Group 6 male were primed in Hemagglutinating Virus of Japanese Envelope (HVJE) and boosted in PBS. Group 3 female and Group 7 male were immunized with Non-ionized surfactant vesicle (NISV) through subcutenious route. Group 4 female and Group 8 male were immunized with Bilosome orally. Group 1 females and Group 5 males served as untreated control. In study week 24 significantly higher ($p>0.001$) anti-GnRH-I antibody (OD value at A_{540}±SD) response ws detected in NISV (0.982±0.231) and HVJE (0.783±0.191) mediated immunization than Bilosome (0.537±0.183) mediated immunization. Immunization of female mice prolonged estrous period and reduced cellular densities in vaginal lavages. Significant reduction of ovarian folliculogenesis was seen in Group 2 ($p>0.01$) and Group 3 ($p>0.001$) mice. Vaccinated male mice in Group 6 and Group 7 appeared infertile. Reduction of serum testosterone concentration (ng/ml) in Group 6 (1.575±1.273) and Group 7 (0.625±0.417) male was seen compared to a low affect in Group 8 (4.465±0.959) and unaffected in Group 5 controls (7.268±3.374). The plasmid DNA delivered with HVJE and NISV arrest fertility in males and suppress fertility in females mice.

rimahstu@yahoo.com