Effect of Mobile Phone Induced Electromagnetic Fields on The Development of Chick Embryo

Sir,

Mobile telephone has become an essential part of global culture. However, its safety is still in question among the researchers. These phones operate upon Radio Frequency (RF), Electromagnetic Fields (EMFs) that are non-ionizing, oscillating waves, which have the capability to interfere with the biological electrical activities of the living organism and bring about subtle non-thermal effects. Some of the reported effects of RF radiations are DNA damage,[1] alteration in signal transduction,[2] inhibition of cell proliferation and kinetics,[3] free radical production[4] and metabolic effects.[5] All these effects can lead to changes in the biophysiology of the living organism, manifesting in the form of cancerous developments, metabolic disorders and embryonic malformations.

Some researchers, however, are convinced that there are no measurable EMFs associated changes.[6] Even the genotoxic effects of the RF, most stressed by some scientists have been denied by the others.[7] A recent study has even demonstrated that a magnetic field can enhance the nerve growth, regeneration, and functional recovery of peripheral nerves.[8]

We report the findings of a preliminary project carried out at the Department of Anatomy, Regional Centre CPSP, Islamabad, in which developing chick embryos were exposed to mobile phone induced EMFs and were compared at day 10 of development, as well as at the time of hatching with non-exposed controls of the same age. Freshly-laid fertilized chicken eggs of Egyptian Fayoumi breed obtained from Poultry Research Centre Rawalpindi, were divided into two main groups, control and experimental, having 10 eggs each. Half of the subjects (i.e. n=5) from each group, were sacrificed and studied at the embryonal day 10 (considering first day of incubation as day 1) and the other half (i.e. n=5) were followed till hatching or day 23 whichever was earlier.

Both the control and experimental subjects were incubated under identical standard conditions. A GSM operated mobile telephone was placed in the incubator, at the centre of the eggs of the experimental group. This telephone, set at non-vibratory silent mode, was "rang-up" for 15 minutes twice daily from any other line or cell phone.

At day 10, half of the eggs from both the groups were broken open, the embryos' survivability was recorded and they were inspected for any physical deformity before fixing in 10% formalin. It was observed that embryos of both the groups exhibited same survivability i.e. 4 embryos out of 5 were living at the time of sacrifice in both the groups. However, the embryos of the experimental group had smaller sizes, and delayed developmental milestones compared to the control. Post-fixed, mean vertex-coccyx length of the experimental embryos was significantly less than control embryos, with a p-value less than 0.05. The mean weight of experimental embryos was also less compared to the control but this difference was not statistically significant. There was no dorsal body hair line, eyelids, or beak hardening in the experimental embryos, while all these developmental milestones were recorded in the control.

The rest of the incubated eggs were followed till their hatching or day 23, after which the eggs, which failed to hatch naturally, were manually opened-up. This natural or assisted mode of hatching also reflected the well - being status of the chicks. Like the day 10 subgroups, the survivability of the newly hatched chicks was recorded and they were inspected for any physical deformities. Their weights and vertex-coccyx lengths were also compared.

It was recorded that while all the control embryos hatched naturally on day 22 of incubation, none of the subjects of the experimental embryos managed to do the same. They had to be manually opened after waiting 24 more hours i.e. on day 23. Although all the hatched chicks of the experimental group were fully formed with features approximating those at the time of hatching, the number of chicks found alive were only 2 out of 5 compared to 5 out of 5 in the control group.

On gross inspection, all the experimental chicks, whether dead or alive, showed an identical physical deformity compared to none in the healthy chicks of the control group. These physically deformed chicks exhibited a defect in the anterior abdominal wall, with something coming out of the abdomen. The histology of the protruding structure confirmed it to be the yolk sac. In addition to this defect, one of the live subjects also exhibited hyperextension of the neck, limbs and body with fanned out webs and inability to stand. It was extremely irritable, did not open its eyes throughout the brief hours of its life.

The recorded vertex-coccyx length of the experimental group at the time of hatching was significantly more than the control. Also, the mean weight of the experimental

group was more compared to the control but this increase was not statistically significant. The observed increased lengths of the experimental group at the time of hatching could be explained due to loss of body contours of the physically deformed chicks. Since the abdomen was not closed completely anteriorly, this might had led to decreased body rounding and hence increase in lengths of the chicks. In one of the chicks, the observed hyperextension of the neck and the body might have contributed to the loss of spinal curvature and thus increased body length. The reduced survival of the experimental chicks can also be related to the generalized congenital anomalies noticed in this subgroup.

Significant developmental delay and malformations, along with decreased survival of the exposed chicks were noticed in this project. A detailed histological study, based on this preliminary report, is underway on a neural organ (retina) of developing chick embryos.

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Comparison of Different Phenotypic Methods of Detection of Methicillin Resistance in *Staphylococcus* aureus with the Molecular Detection of *mec-A* Gene

Sir,

We read with interest the article by Zeeshan *et al.* in your prestigious journal.[1] Indeed, methicillin-resistant *Staphylococcus aureus* (MRSA) is an escalating issue that is spreading beyond the boundaries of the hospital.[1] The article rightly points out that rapid and accurate identification of MRSA infections is imperative for better management and optimal therapy. This will ensure not only a better clinical outcome but also a more targetted therapy, which will help in curtailing the emergence of antibiotic resistance.

Identification of MRSA in a limited resource setting calls for some important considerations such as rapidity, accuracy and cost. It is highly commendable that Zeeshan *et al.* has touched upon all these factors. However, we would like to draw the attention of the medical community to the recently FDA approved diagnostic test for MRSA.[2] This user-friendly molecular assay namely, BD Ohm StaphSR Assay, takes only two hours for identification of MRSA compared to an estimated 24-48 hours for the previously established tests.[1,3] Its sensitivity and specificity is also comparable to the rest of the methods done for the same purpose.[3] The only issue that remains to be explored is its cost-effectiveness. However, utilization of such rapid test can result in decreased mortality and shortened hospital stay which may tip the balance of cost-effectiveness in its favour.[4] We strongly suggest further studies into the utility of this test in the local setting, keeping in view the same factors as discussed by Zeeshan *et al.*

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