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MOIRÉ, RASTER AND EEG STUDIES OF EPILEPTICS DURING WASHABLE MEMORY PERIOD

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Posture studies of epileptics during washable memory period using noninvasive optical techniques like moiré fringe topography and rasterstereography may provide clues to the etiology of this disease.

INTRODUCTION

Epilepsy is one of the diseases faced with most skepticism in Pakistan. It is associated with a very high rate of mortality and morbidity. There is a need to understand and find treatments for this disorder. Magnetoencephalography (MEG) and scalp electrode recordings from EEG have been useful in locating epileptic foci and understanding the nature of electrical activity in brain.

Since the siezure involves heavily the muscoskeletal system it would be of interest to study the posture of patients in between the siezures, during the aura and possibly after the ictus during the washable memory period.

The posture could be studied by ordinary photographs, stereo-photographs, moiré topographs and rastergraphs. In the next section we are going to discuss a little bit about moiré and raster techniques.

THE MOIRÉ TECHNIQUE

Moiré topography is an optical technique that produces shadow patterns (fringes) which can be arranged to provide a map of three-dimensional surfaces by generating contours which are curves of constant height without using X rays or any other ionizing radiation. Moiré fringes are a series of interference fringes arising from the superposition of sets of parallel lines or threads, the sets being slightly inclined to one another. The width of the lines of the grid should be equal to the space between them. A *shadow type moiré topography* apparatus (cf. Fig. 1) has been used since 1979 to study the spinal column (Kamal & Lindseth, 1980; Kamal & El-Sayyad, 1981; El-Sayyad & Kamal, 1981). Fig. 2 shows symmetric moiré pattern of a normal spine. A recent version consists of a wooden frame of dimensions 40 cm x 80 cm. Nylon thread of 0.7 mm diameter is wound along the longer side with spacing equal to the diameter (Kamal,

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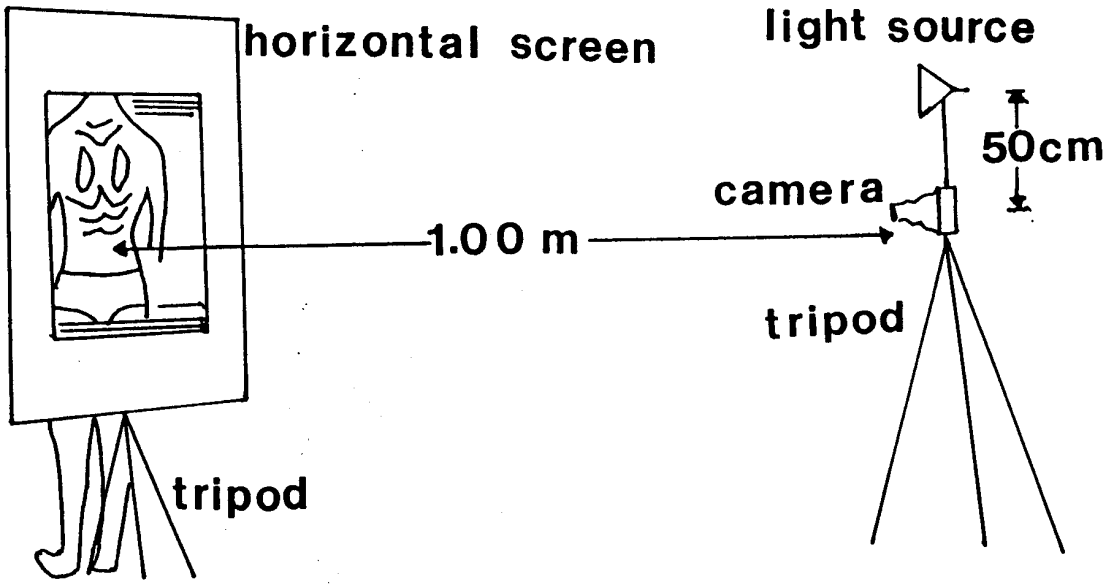

FIG 1: ARRANGEMEMENT OF EQUIPMENT

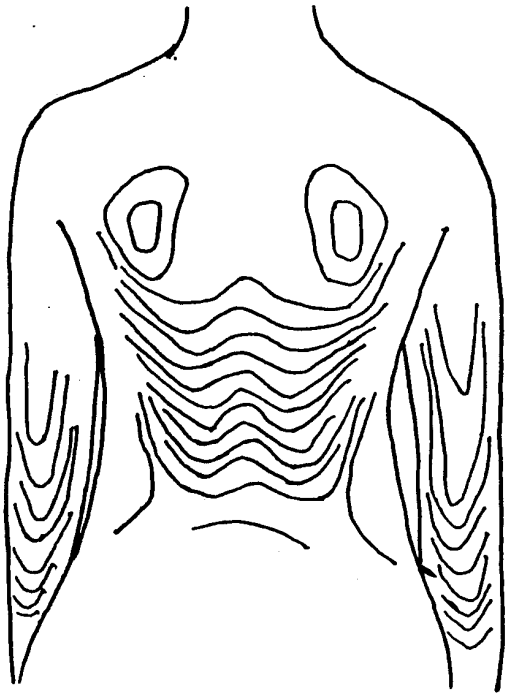

FIG 2: MOIRE PATTERN OF A NORMAL SPINE

Bukhari and Akram, 1988). To obtain sharper fringes we are using parallel light from a slide projector. The light source and camera are placed 150 cm from the screen and both are located in a plane parallel to the moiré frame. Light source and camera are situated on a line perpendicular to the stretched threads. The separation of the camera and the light source is 110 cm. For these distances the height difference between successive fringes is 0.2 cm. This method is simple and gives a lot of information, but it requires bulky equipment. *Projection type moiré* equipment is compact and allows free space round the patient. Details about the various type of moiré techniques could be found elsewhere (Kamal, Akram and Bukhari, 1988). At present we have available a shadow type apparatus in Karachi. However, in future we would try to obtain a projection type apparatus to photograph the epileptics because we would like not to disturb them after the siezure.

RASTERSTEREOGRAPHY

We are just starting to obtain rastersteroegraphs to study posture and obtain surface information from the geometry of the set up. Rasterstereography is very similar to stereophotography. The difference is that one of the cameras is replaced by a slide projector/overhead projector and a raster is projected on the body. Because of the curvature of the body the raster is distorted. Study of this distortion provides information about the topological properties of the surface under study. The remarkable feature of rasterstereography is that it does not require a specific arrangement of the apparatus to obtain meaningful rasters, whereas only a specific geometry of the moiré set up would provide contours with desired mathematical properties. This procedure seems ideal for the study of epileptics because it would not disturb their position in any way.

STUDIES OF NORMALS AND EPILEPTICS

We are studying moiré topographs and rasterstereographs of backs of normal five to ten years old children in standing, sitting and lying position in Karachi and Hyderabad. We would also like to obtain their resting EEG's and ECG's simultaneously to find out any relationship between the two. Once we have a database for normal children we would start studying children suffering from epilepsy who visit the Jinnah Postgraduate Medical Centre Epilepsy Clinic. This clinic serves patients from all over Pakistan. By these studies we hope to establish a database on epileptics, compare their data with the normals and possibly test some mathematical models like the ones we are working on (Kamal, Siddiqui and Husain, 1989).

CONCLUSION AND RECOMMENDATIONS

Epilepsy is a disease which is faced with lot of fear by the general population. There is a need for more education as well as rehabilitation programs for such patients. This an be achieved if we start research programs which are cost effective, do not pose risk to

the patients, provide a lot of information from simple procedures, do not require very skilled personnel for the operation of instruments, and acceptable to the general population. Moiré and raster techniques are such techniques which could be easily applied in the third world countries. Not only will they assist in the improvement of health care for epileptics but also they could be applied to detect malnutrition, as well as spinal deformities.

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