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USE OF IONIZED AIR IN BURNS MANAGEMENT— A PRELIMINARY REPORT

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SUMMARY

Installation of an 'Air Ionizer' in rooms where burn patients are admitted has given encouraging results in various aspects of burns management. The spectra of contaminating bacteria have narrowed, and such rooms appear de-odourised in comparison. There is a feeling of well being in these patients. Eschar separation was earlier in them, with the appearance of healthier granulation tissue, and consequently a lesser period of hospitalisation.

The concept of 'polarised air' within offices and study rooms to improve performance is about three decades old i.e. ever since we became aware of the deleterious effects of atmospheric pollution (Silverman, 1957). Almost at the same time the action of air ions on bacteria has been studied (Krueger, 1957) and the observations on artificial ionization of the burnt patient presented (David et al, 1957).

Bio-physics of atmospheric contamination and purification

Viruses and bacteria utilise the medium of suspended particles to contaminate. More of such particles favour this suspension and gravity aids in their 'settling'. They are light and therefore have a tendency to float and multiply. Viruses and bacteria multiply favourably when the atmosphere is electrostatically positive (Krueger, 1957). There is a tendency towards electropositivity in the atmosphere, as there is friction between suspended particles, when a molecule loses an electron consequent to this friction. It follows therefore that there is more of positively charged particles in the air. Like poles repell. This exacerbates suspension, i.e. the particles which are the medium for viruses and bacteria. Lightening is Nature's method of atmospheric purification. Following lightening there is a high voltage and electrons are dispersed, with restoration of neutral particles. An 'ion-balance' is thus created. The accompanying rain physically aids in this purification.

Materials and Methods

The Ionizer

This is an effective negative ion generator. (Fig. 1) which can be hung within the room. Through high voltage it generates millions of negatively charged ions every second within the room where it is installed. Positively charged particles are constantly neutralised and gets drawn towards the ioniser. The vicinity of the ionizer gets soiled within a matter of few days (Fig. 2). The room is kept constantly closed with a corner window open near which an 'air-blower is kept for circulation. Because the ionizer has a solid-state circuit within, the high voltage is not dangerous to persons.

The department of Plastic Surgery at St. John's Medical College Hospital treats burn-injured patients in rooms measuring 15 feet $\times$18 feet. We do not follow the 'exposure line of management'. Burn wounds are dressed with sterile dressings under aseptic conditions. The burn-injured patients considered for the study were 20 consequtive patients as two groups of ten each. Group I being the control and Group II those exposed to ionized air. The clinical parameters were identical.

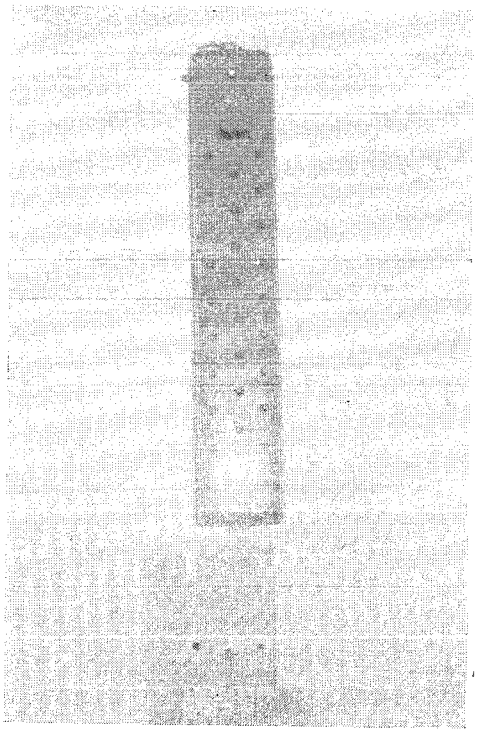

Fig. I. The Ionizer on day of installation.

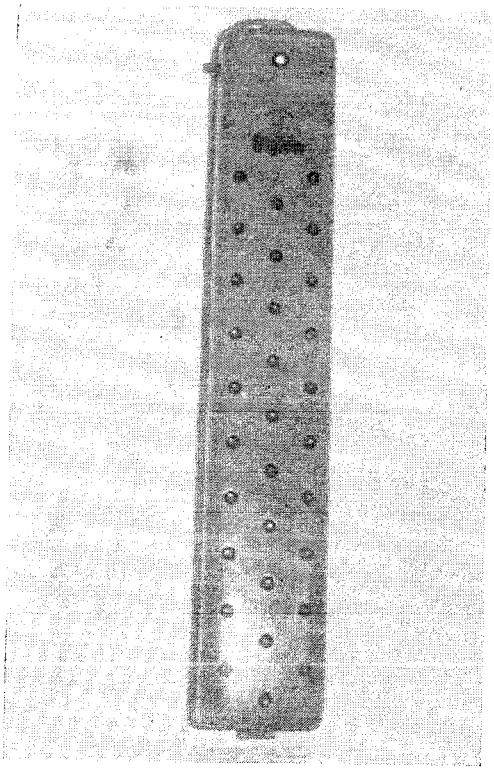

Fig. II. The Ionizer with its vicinity soiled two weeks following.

All had around 30% deep flame burns, were within the age group 25 to 35 years with approximately 50 kg body weight. None had any complicating associated illness.

Bacteriological studies were confined to only one room of the present study, whereas clinical evaluation was done in all the twenty patients for a comparative equation.

Before admitting patients, swabs were taken from the room with the ionizer switched off, from near the ionizer and from three levels (1) Table top, (2) Bed (3) Floor, for bacteriological studies.

The ionizer was then switched on, and four days later swabs were taken from identical sites. Following this patients were admitted.

Four days following patient admission swabs were taken from identical sites with the ionizer working. Tab. I shows the comparison in colony growth in blood agar plates exposed to detect droplet nuclei at the three levels, with and without the ionizer and before patient admission.

Table I. Blood agar plates exposed to detect droplet nuclei at three levels

Level	Colonies-growth at 96 hours without Ionizer	Colonies-growth at 96 hours with Ionizer
(1) Table top	64	9
(2) Bed	63	8
(3) Floor	61	10

Thus we were convinced of the efficacy of the Ionizer. Following patient admission in the same room, similar swabs were taken from identical sites on the fourth day and colony count was done following exposure to blood agar plates at 96 hours. The result of this is given in Tab. II.

Table II. Colony count from swabs taken on fourth day following patient admission with the Ionizer working

Levels	Colonies at 96 hours
(1) Table top	20
(2) Bed	29
(3) Floor	39

Table III. Clinical parameters in comparison

Parameter	Rooms with Ionizer	Control
(1) Patient feeling	Feeling of 'well being'	Unremarkable
(2) Average period for full eschar separation	16 days	24 days
(3) Appearance of granulation	'Healthy red'	Paler
(4) Room odour	Nil	More in comparison

Clinical co-relation

The clinical parameters given in Tab. III were considered for all twenty patients for comparison.

Couclusion

The Ionizer has much to commend it particularly in our set up, specially in the 'border-line' burn-injured, where any uncontrollable bacterial infection would be the life-taker. It definitely reduces period of hospital stay.

The Ionizers are of different sizes for rooms of different measurements, and are economical in installation and subsequent maintenance (power consumption-three to five units monthly).

It is worthwhile observing the findings published almost three decades back, and practising them in present day burns management (Kornblueh, 1958 and Theodore, David, 1960).

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