

Air-Conditioners as Source of Infection

Taj B. Uppal,* M.B.,B.S.,
D.Bac. (London).

*Khyber Medical College,
Peshawar, Pakistan*

Summary

Condensation water from 15 air-conditioners, fixed in different kinds of rooms, was tested as regards their bacterial contents. Bacillus spp. was found in almost all the waters tested but Pseudomonas aeruginosa was also found from air-conditioners fixed in rooms with heavy traffic. Proper disposal of this water, especially in hospitals, is recommended as it may become a source of infection to any susceptible person.

Introduction

The air-conditioners, during cooling, condense water from inside the humid atmosphere of the room and discharge it outside. It is possible that organisms from inside the room atmosphere are also collected in the condensed water and these are then discharged outside along with the water of condensation.

As the role of air-conditioners in Legionnaire's disease has been well-established (Dondero et al, 1980; Cordes, et al, 1980), this study was undertaken to find the types of organisms present in discharging water and the effect of conditions in the room atmosphere on the types of organisms present.

Material and Methods

At least 10 milli-litres of condensation water was collected from air-conditioners installed in different rooms of Khyber Medical College and different wards of Khyber Teaching Hospital, Peshawar, directly into a sterile tube. The water was visually examined for its clarity and temperature.

The water was centrifuged for 10 minutes at 2500 RPM. The deposit was examined directly under microscope for the presence of any dust particles, spores or pollen grains. It was also inoculated onto 5 per cent sheep blood agar and MacConkey agar plates.

* Professor of Bacteriology, Department of Pathology, Khyber Medical College and Visiting Professor of Bacteriology, Postgraduate Medical Institute.

TABLE I
BACTERIOLOGICAL RESULTS OF CONDENSATION WATER
FROM DIFFERENT ROOMS

No.	Type of room	Organisms isolated	Organisms isolated on repeat culture
<i>A. Rooms remaining closed most of the time :</i>			
1.	Projection room, K.M.C.	No growth	No growth
2.	Conference room (large hall), K.M.C.	1. Bacillus spp.	1. Bacillus spp.
<i>B. Rooms with light traffic :</i>			
3.	Office, Principal, K.M.C.	1. Bacillus spp. 2. Providentia rettgeri	1. Bacillus spp. 2. Providentia rettgeri
4.	Office, Professor of Pathology, K.M.C.	1. Pseudomonas fluorescence	No growth
5.	Audiovisual department, K.M.C.	1. Bacillus spp. 2. Flavobacterium	1. Bacillus spp. 2. Flavobacterium
6.	Doctor's office, K.M.C.	1. Bacillus spp.	Not tested
7.	Office, Administrator, K.T.H.	1. Micrococcus 2. Esch. coli 3. Pseudomonas aeruginosa	1. Esch. coli 2. Pseudo. aeruginosa
<i>C. Rooms with heavy traffic :</i>			
8.	Bacteriology laboratory, K.M.C.	1. Bacillus spp. 2. Pseudo. aeruginosa	1. Pseudo. aeruginosa
9.	Library (large hall), K.M.C.	1. Bacillus spp.	1. Bacillus spp.
10.	Medical ward, K.T.H.	1. Bacillus spp. 2. Pseudo. aeruginosa	1. Bacillus spp. 2. Pseudo. aeruginosa
11.	Surgical ward, K.T.H.	1. Bacillus spp. 2. Pseudomonas aeruginosa 3. Micrococcus	1. Bacillus spp. 2. Pseudomonas aeruginosa
12.	Eye ward, K.T.H.	1. Bacillus spp. 2. Pseudomonas aeruginosa	Not tested
13.	E.N.T. ward, K.T.H.	1. Bacillus spp. 2. Pseudomonas aeruginosa	Not tested
14.	Obstetrics and Gynaecology ward, K.T.H.	1. Staph. epidermidis	1. Staph. epidermidis
15.	Operation theatre, K.T.H.	1. Bacillus spp. 2. Pseudomonas aeruginosa	Not tested

Note : K.M.C. — Khyber Medical College, Peshawar
K.T.H. — Khyber Teaching Hospital, Peshawar

The plates were examined after 24 hours-incubation at 37 degrees centigrade for bacterial growth. No attempt was made to isolate *Legionella* spp. Tests on fresh specimens from some air-conditioners were repeated after an interval of two weeks to see any change in the types of organisms isolated.

Results

Water from 15 air-conditioners fixed in different kinds of rooms was tested. The rooms were of three types; those remaining closed most of the time, those with light traffic and those with heavy traffic. Some of the rooms were carpeted.

The temperature of the discharged water varied from 43 to 45 degrees centigrade, while that inside the room was between 32 and 35 degrees centigrade.

From rooms which remained closed most of the time, either no growth was obtained or growth of those organisms which are usually non-pathogenic was obtained.

From rooms with light traffic, growth of mostly non-pathogenic organisms was obtained.

But from these rooms in which there was very heavy traffic, such as hospital wards and laboratories, growth of *Pseudomonas aeruginosa* was obtained in addition to non-pathogenic organisms.

On repeat cultures of fresh specimens from some of the air-conditioners, after an interval of about 2 weeks, growth of the same organisms was obtained (Table I).

Discussion

The condensation water dripping out of the air-conditioners, especially those fitted in rooms with heavy traffic, such as hospital wards and laboratories, may contain dangerous pathogenic organisms which may have been sucked inside the room air-conditioners from inside the room atmosphere and deposited on the condensers. These then get discharged out in the water. It is also possible that the organisms collected may multiply in the collected water before its discharge outside: that may be the reason that the same organisms were isolated on repeat culture.

It is therefore proposed that this water, which is potentially dangerous and liable to spread infection, should be properly disposed off and should not be allowed to drip on the floor of corridors especially in the hospitals. The organisms present will contaminate the floors. Few organisms will be dislodged from the floor by air movement but walking on them will result in significant resuspen-

sion (Parker, 1984) and may become an important cause of nosocomial infections.

Therefore it is suggested that proper care should be taken in the disposal of condensation water from air-conditioners in the hospital wards and laboratories in order to control spread of infection.

References

1. Cordes, L.G. et al (1980): "Legionnaire's Disease Outbreak at an Atlanta, Georgia, Country Club: Evidence for Spread from an Evaporative Condenser". *Am. J. Epidemiology*; III: 4, 425—431.
2. Dondero, T.J. et al (1980): "An Outbreak of Legionnaire's Disease Associated with a Contaminated Air-conditioning Cooling Tower". *New Eng. J. Medicine*; 302: 7, 365—370.
3. Parker, M.T. (1984): "Hospital Acquired Infections", in Topley and Wilsons, "Principles of Bacteriology, Virology and Immunity". 7th ed., Edward Arnold, London; 3: 192—220.