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SURVEY OF MICROBIAL CONTAMINATION OF DRINKING WATER IN HUMAN AND ANIMAL POPULATIONS IN GREAT CAIRO

By

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ABSTRACT

The term "drinking water" is a wonderfully ambiguous pairing of words. "Drinking" can be an adjective, describing the many natures of this clear liquid. This water has special, vital qualities. It's not ocean water, not dish water, and not swamp water. It is potable water safe enough to consume without getting sick. A rare liquid, one that will become less and less taken for granted in the future.

Key words:

WHO: World Health Organization**, WWAP:** World Water Assessment Programme, **USDA:** United States Department of Agriculture, **NIFA:** National Institute of Food and Agriculture

TPC: Total Plate count.

INTRODUCTION

Water is essential for life. Water is indispensable for human health and well-being, and is crucial for sustainable development. Throughout history, civilizations have flourished around rivers and major waterways. Although water is essential for life, it can also cause devastating effects as an effective carrier of pathogens, able to transmit disease to a large proportion of the population in a very short time span (1). The term "drinking water" is a wonderfully ambiguous pairing of words. "Drinking" can be an adjective, describing the many natures of this clear liquid. This water has special, vital qualities. It's not ocean water, not dish water, and not swamp water. It is potable water-safe enough to consume without getting sick. A rare liquid, one that will become less and less taken for granted in the future (2). Research has demonstrated a positive relationship between access to clean drinking water and performance factors such as growth, reproduction, and milk production. Animals that drink clean, contaminant-free water are generally less prone to illness and disease, gain more weight, and

produce more milk. Producers have a great deal of control over both the quantity and quality of water that is provided to animals. (3). Monitoring water quality and observing best management practices (BMPs) for water management are inexpensive yet effective ways to improve overall animal performance (4). The microbial guidelines seek to ensure that drinking water is free of microorganisms that can cause disease. The provision of such a supply is of paramount importance to the health of a community. The most common and widespread health risk associated with drinking water is contamination, either directly or indirectly, by human or animal excreta and the microorganisms contained in faeces. (5) If the contamination is recent, and those contributing to the contamination include carriers of communicable enteric diseases (diseases of the gut), some of the microorganisms that cause these diseases may be present in the water. Drinking such contaminated water or using it in food preparation may cause new cases of infection. Those at greatest risk of infection are infants and young children, people whose immune system is suppressed, the sick, and the elderly. Pathogenic (disease-causing) organisms of concern include bacteria, viruses and protozoa; the diseases they cause vary in severity from mild gastroenteritis to severe and sometimes fatal diarrhea, dysentery, hepatitis, cholera or typhoid fever (6). So the aims of the present study were evaluation of microbial contamination of drinking water in human and animal populations in great Cairo.

MATERIAL AND METHODS

Sample:

150 water samples collected from different places in Cairo and Giza in screw-capped non-reactive borosilicate sterilized glass bottles have been cleaned and rinsed carefully. Bottles of samples should contain3 % Sodium thiosulfate ($Na_2S_2O_3$) is a satisfactory dechlorinating agent. Analyze samples on day of receipt whenever possible and refrigerate overnight if arrival is too late for processing on same day, not exceed 30 h holding time from collection to analysis for coliform bacteria. All samples were subjected to examination the following: Total plate count, coliform, *E. coli.*

Enumeration of Aerobic plate count:

Pour plate technique was used according to international standard organization (ISO 4833-2003) about 20 ml of plate count medium at 44OC - 47 OC were poured into each Petri dish.

Identification and enumeration of coliforms group:

Filtration of 100 ml from sample using membrane filters 0.45 mm pore size. Place the filter on M endo agar medium, ensuring that no air trapped underneath. (ISO 9308-1) Incubated at 35°c for 24 ±2 hr.

Confirmation of coliforms:

Five colonies of each doubtful type were inoculated into tubes of diluted lauryl sulphate broth; the tubes were incubated at 35°c for 48 ±2 hr. consider positive colonies which show turbidity and gas formation in the Durham tubes as coliforms. Then took 1ml from each positive tube on brilliant green. The tubes were incubated at 35°c for 48 ±2 hr.The results were taken into account in the calculation.Consider colonies which show turbidity and gas formation in the Durham tubes as coliforms.

Identification and enumeration of *E.coli.*

Filtration of 100 ml from sample using membrane filter 0.45 mm pore size. Place the filter on Mfc agar medium, ensuring that no air trapped underneath. (ISO 9308-1) incubated at 44.5°c± 0.2 for 24 ±2 hr

Confirmation of *E.coli*

Colonies of each doubtful type were inoculated into tubes of diluted lauryl sulphate broth; the tubes were incubated at 35°c for 48 ±2 hr. consider positive colonies which show turbidity and gas formation in the Durham tubes as coliforms. Then took 1ml from each positive tube on EC with mug and incubated at 44.5°c± 0.2 for 24hr.

RESULTS

Table (1): Percentage of contamination in Cairo and Giza during autumn

Autumn	Coliform	*E.coli*	Enterococcus fecales	Pseudomonas	Clostridia	TPC 35	TPC 22
Cairo	**12%**	**10%**	**14%**	**16%**	**0%**	**18%**	**18%**
Giza	**26%**	**24%**	**22%**	**20%**	**0%**	**26%**	**16%**

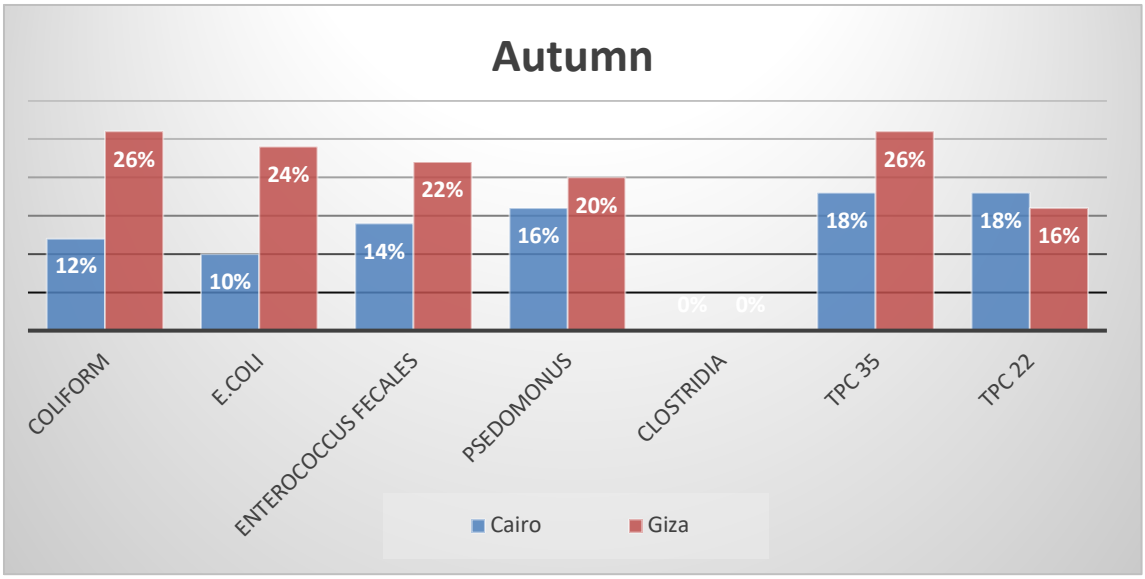


Table (2): Percentage of contamination in Cairo and Giza during summer.

Summer	Coliform	*E.coli*	Enterococcus fecales	Pseudomonas	Clostridia	TPC 35	TPC 22
Cairo	12%	12%	10%	16%	0%	18%	20%
Giza	28%	18%	18%	22%	0%	28%	30%

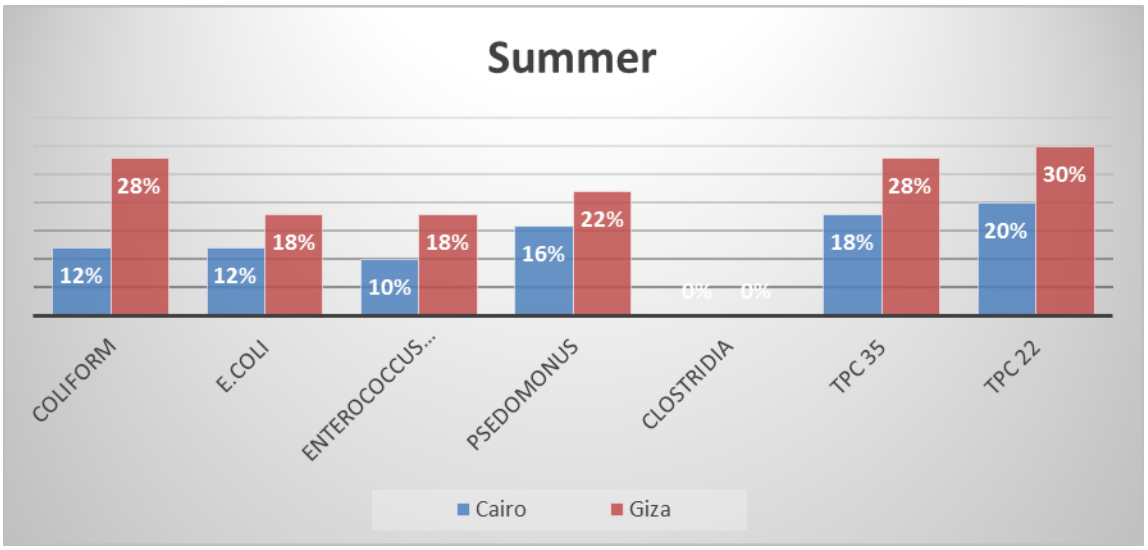
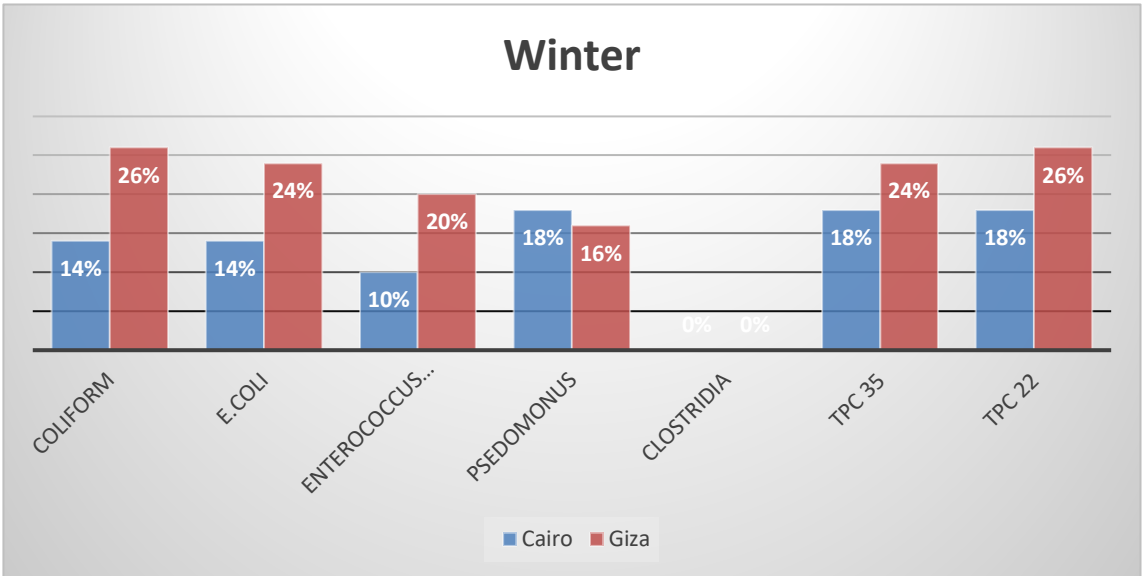


Table (3): Percentage of contamination in Cairo and Giza during winter.

Winter	Coliform	*E.coli*	Enterococcus fecales	Pseudomonas	Clostridia	TPC 35	TPC 22
Cairo	14%	14%	10%	18%	0%	18%	18%
Giza	26%	24%	20%	16%	0%	24%	26%



DISCUSSION

All animals require water, water is needed to transport compounds via the blood, maintain cellular structural integrity, regulate temperature, etc. Livestock can satisfy water needs by drinking free water, consuming feedstuffs high in water content or doing both. In fact, if stocker cattle are provided abundant quantities of lush winter annual pasture (70 to 80 percent water), they may not need an additional water source. Domestic animals in otherwise good health can live for approximately 60 days without food, but only seven days without water. Dehydrated cattle will appear gaunt and listless and will have dry noses and sunken eyes. (7) Hearing and sight both are adversely affected in a dehydrated state. Economic losses, due to the lack of water and sanitation in Africa as a result of the mortality and morbidity impacts, are estimated at $28.4 billion or about 5% of GDP. (8.). Water pollution causes approximately 14,000 deaths per day, mostly due to contamination of drinking water by untreated sewage in developing countries. An estimated 700 million Indians have no access to a proper toilet, and 1,000 Indians children's die of diarrhea every day and so many other countries too. Poor

water quality continues to be a major public health problem globally. According to the World Health Organization, diarrhoeal disease accounts for an estimated 4 % of the total global burden of disease measured in disability adjusted life years (DALYs) and around 1.8 million deaths every year. It has been estimated that almost 90% of that burden is attributable to unsafe water supply, sanitation and hygiene, mainly affecting children in developing countries (9).In waterborne outbreaks, the contamination episode may be of short duration and the concentration of pathogens in the water may be low. Often isolation of the pathogen from random water samples is difficult. A more feasible approach is analyzing water samples for indicators of faecal contamination, such as thermos tolerant coliform bacteria, *E. coli*, faecal streptococci and *Clostridium perfringens* spores. The presence of bacteria does not mean the water is unsafe to drink. Only disease-causing bacteria, known as pathogens, lead to disease. Total coliform bacteria are a group of different kinds of bacteria commonly found in the environment, including soil, vegetation and untreated surface water. Total coliform bacteria are generally not harmful. Fecal coliform bacteria are a subgroup of the total coliform group. They exist in great quantities in the intestines and feces of humans and animals. The presence of fecal coliform bacteria in drinking water is a strong indication of recent sewage or animal waste contamination, which should be interpreted as an indication that there is a greater risk that pathogens are present. Microbes in these wastes may cause short-term effects, such as diarrhea, cramps, nausea, headaches or other symptoms, as well as potentially pose long-term health effects. They may pose a special health risk for infants, young children, some of the elderly and people with severely compromised immune systems (11).

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