ASSESSMENT OF MICROBIAL AND CHEMICAL LOAD OF SOME DRINKING WATER PLANTS INTAKES IN GREATER CAIRO

Submitted By

Mona Ezzat Abd El-Tawab Abd El-Samad

B.Sc. of Science (Chemical,Microbiology), Girl Faculty, Ain Shams University, 2000

Diploma in Microbiology, Faculty of Benha Science,Zagazig University, 2001

A Thesis Submitted in Partial Fulfillment

Of

The Requirement for the Master Degree

In

Environmental Sciences

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APPROVAL SHEET

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2019

سورة البقرة الآية: ٣٢

ACKNOLEDGMENT

First of all, all thanks & praise are to ***Allah*** for giving me prosperity & strength to fulfill this work.

I would like to express my deepest gratitude to my advisor, ***Prof. Dr. Ayman Helmy Kamel,*** Professor of Analytical Chemistry, Faculty of Science - Ain Shams University for his excellent guidance, caring, patience, valuable advice and the facilities provided to carry out the research.

I will forever be thankful to my second supervisor, ***Prof. Dr. Rawhia Abd Elmonam Arafa,*** Professor of Microbiology, Botany and Microbiology Department - Faculty of Science in Azhar University (Girl Branch), for her supervising, continuous encouragement, and sincere help in field work.

I will forever be thankful to **Basic Science Department** in Institution of Environmental Studies and Research. Also for **managers and colleagues of water control department** in the ministry of health.

My special words of thanks should also go to my ***Mother***, my sister ***Abeer***, my brothers ***Mohammed and Ahmed***, for their love and helpful co-operation.

I express my heartfelt thanks to my sincerely my husband ***Talal Elsayed***, my Son ***Ahmed*** and my daughter ***Menna***, they were always cheering me up and stood by me and encouragement during the hard time through this work until it comes to light

A special thanks to the spirit of my ***Father***, he was always motivating me and encouraging me since my childhood.

Abstract

River Nile is the main source of fresh water for domestic, agriculture, industry, fisheries and tourism purposes for most governorates in Egypt.

Unfortunately, the drinking water plant intakes on River Nile is impacted by increasing concentrations of pollutants resulted from the agricultural drains located along its sides, industrial effluents and domestic waste from villages which have no sanitation system.

This study aims at monitoring Total coliform, *E.coli*, algae which may be related with the risk of diarrheal diseases and other diseases if they are present in water. Also, suggesting limits for them in the criteria of drinking water plant intakes at Article 49 from decree No. 92 of 2013 in law No. 48 of 1982 for the protection of River Nile from pollution. Also to monitor microbiological and chemical water quality and expect any early water deterioration that will facilitate the solution before aggravate the problem.

All samples collected from drinking water plants intakes were chosen in four seasons from September 2016 to October 2017. Each source of water samples was collected every month at three governorates: Cairo (Al Amarya - Al Tepeen - Manial Al Rawdah - Maadi), Giza (Embaba - El Saff- Gezirat Al Dahab-Giza - Al Hawamdiyah-Kafr Kandeel), and Kalyobia (Abo Zaabal - Al Reeyah El Tawfekey - El-Abadla - Basoos - Qualube) . The total numbers of collected samples from intakes and produced water were 210 samples. The parameters under investigation were: Total Coliform, *E.coli* and algal count by Sedgwick Rafter cell was also done.

In addition, pH, Total dissolved Solids (TDS), Biological Oxygen demand (BOD), Chemical Oxygen demand (COD), Cadmium, Chromium, Lead, Zinc, Total Phosphorus (TP), Total Nitrogen (TN), Ammonia, Organophosphorus and Chlorinated pesticides.

Results showed that the Nile water contain high count of pathogenic indicator bacteria (pollution indicator) and algae where the intakes mean of most probable number for Total coliform ranged between 10.33×10^3 and 6.75×10^4 /100cm^3. *Escherichia coli* ranged between 12×10^3 and 1.37×10^4 /100 cm^3.

The mean algal count ranged between 1783 and 3718 unit /1ml. The most algae types present in Nile water are Diatoms with percent 73.3 % followed by green algae with percent 24 %and the lowest is Cyanobacteria (blue green) with percent 2.7 %. While all chemical analysis was compliance with the criteria at Law No. 48 of 1982 except COD mean was in six intakes. Also lead, zinc and cadmium were violate the limits in some intakes on Al Reeyah El Tawfekey canal and Ismailia Canal due to many industries.

Keywords: Total coliform*; E. coli;* drinking water plant intakes*; algal* count*;* BOD*;* COD.

CONTENTS

LIST OF ABBREVIATION

No.	Abbreviations	Meaning
1	**BCM**	Billion cubic meter
2	**BOD**	Biological Oxygen Demand
3	**Cd**	Cadmium
4	**Cr**	Chromium
5	**COD**	Chemical Oxygen Demand
6	**DO**	Dissolved oxygen
7	**DWTPs**	Drinking Water Treatment Plants
8	**E.Coli**	Escherichia coli
9	**EEA**	European Environmental Agency
10	**EPA**	Environmental Protection Agency
11	**GC**	Gas Chromatography
12	**HAB**	Harmful algal bloom
13	**HCH**	Hexachlorocyclo hexane
14	**mL**	Milliliter
15	**MPN**	Most Probable Number
16	**NH_3**	Ammonia
17	**OCPs**	Organochlorine pesticides

18	**Pb**	Lead
19	**SMWW**	Standard Method for Examinations of Water and Wastewater
20	**TDS**	Total Dissolved Solids
21	**TN**	Total nitrogen
22	**TP**	Total phosphorus
23	**USEPA**	US Environmental Protection Agency
24	**WHO**	World Health Organization
25	**Zn**	Zinc