

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

Submitted By

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

Diploma in Microbiology, Faculty of Benha Science, Zagazig
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A Thesis Submitted in Partial Fulfillment
Of
The Requirement for the Master Degree
In
Environmental Sciences
Department of Environmental Basic Sciences
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2019

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم العليم

صدقة الله العظيم

سورة البقرة الآية: ٣٢

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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 /100cm³. *Escherichia coli* ranged between 12×10^3 and 1.37×10^4 /100 cm³.

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.

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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	NH₃	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