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Parasitic Infection Among Farmers Dealing With Treated Wastewater In Al-Zaitoun Area, Gaza City

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Dedication

I would like to dedicate my thesis and everything I do

To ***my father and my mother*** for their endless love, support and continuous encouragement. Without their love and support I will not be who I am today.

To my brothers and sisters ***Nour, Ramy, Fatima, Hanan, Reem, Wafaa , Mohammed, Ahmed, and Belal***.

To the soul of my first teacher ***Eng. Jamal Al-Dadah***, who guide me for treated wastewater reuse science.

To my close friends ***Alaa' and Rasha.***

To every person who give others without waiting their acknowledgement.

To all those who encouraged and helped me to complete this work.

To all of them I dedicate this work.

Haneen Nabil Al-Sbaihi

Declaration

I certify that this thesis submitted for the degree of Master, is the result of my own research, except where otherwise acknowledged, and that this study (or any part of the same) has not been submitted for a higher degree to any other university or institution.

Signed:

Haneen Nabil Al-Sbaihi

Date: …./…./….

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Haneen Nabil Al-Sbaihi

Abstract

Treated wastewater irrigation is associated with several benefits but can also lead to significant health risks. The main objective of this study is to investigate the parasitic infection (PI) among farmers dealing with treated wastewater (TWW) in Al-Zaitoun area, Gaza City. This study included two farmer groups: farmers who dealing with TWW (Mixed water users (MWUs)), and farmers who irrigate by using groundwater (GW) (Ground water users (GWUs)). Each participant was asked to provide stool samples. Soil, irrigation water, and hand washing water samples were taken from each participant in addition to interview structured questionnaire was filled with all of them. Prevalence of PI was 30.9% and increased to be 47.3% in the 2nd phase which was after using TWW for 3 months. Positive association statically significant was found between PI and TWWR in the 2nd phase (OR=1.37, CI 0.448-4.21). Six parasites species were identified among participants: Entamoeba "histolytica/dispar and coil", Cryptosporidium, Microsporidia, Giardia lamblia, Strongyloides stercoralis, and Ascaris lumbricoides. Prevalence of soil parasitic contamination was 54.5% and increased statically significant to be 61.5% in the 2nd phase. Negative association not statically significant was found between irrigation water type and parasitic soil contamination (OR 1st=0.813, CI 0.265-2.495) and (OR2nd =0.897, CI 0.28-2.876). The highest PI was found between females, participants age ≤ 18 year, participants who had the least Academic qualification, who work in agriculture for period of ≤10 years, and who work ≤ 6 hours per day in the farm. Participants who had less family size and who previously had ant-parasitic drugs had less PI with SSR. High PI was found between participants who had bad financially status, who had landless areas inside their homes, who work in farm far away from their homes, who is a new user for TWW and irrigate more agricultural dunums by it, who didn't work mainly in agriculture, who use fertilizers with TWW, who hadn't toilet in their farm, who disposed from their home and farm toilet into the farm and cesspits respectively, who breed animals/birds in places non- closed inside or beside their farms, who previously diagnosed for intestinal parasites, and who had less HB mean. Non-drinking water consumption per person per day was least at parasitic infected participants. Generally MWUs HB was better than GWUs HB inside home and through harvesting process, but it was less through working in the farm. It was found the HB for MWUs through using TWW periods had increased to be the best.

In spite of, increasing MWUs HB with using TWW, MWUs were working in soils less parasitic contaminated, and they also use localized irrigation technique, it was found a positive not statically significant relationship between PI and using TWW in irrigation, may this attributed for increasing the infection opportunity between MWUs as a result of increasing soil microorganisms activity in their soils by increasing soil organic matter from using TWW, in addition to 80% of participants who within age group ≤ 18 year " who hosting more parasites" were from MWUs.

Key words: *Wastewater, Groundwater, Treated wastewater, Hygiene behavior, Parasitic infection*

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