Groundwater in New Valley and kidney disease.

Thesis

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Dedication

I would like to dedicate this Thesis to

my ***FATHER*** *& the soul of my*

MOTHER*;*

to them I will never find adequate words to express my gratitude.

Also to my ***FAMILY***

for dealing so patiently, tactfully during this work.

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Abbreviations

NSAS	The Nubian sandstone aquifer system
WHO	World health organization
FAO	Food and agriculture organization
TDS	total dissolved salts
Mn	Manganese
Cl	Chloride
EC	Electric conductivity
SAR	Sodium adsorption ratio
RSC	Residual sodium carbonate
CKDU	Chronic Kidney Disease of unknown etiology
NCP	The North Central Province
MAL	maximum-allowed limits
F	Fluoride
As	Arsenic
ATP	Adenosine triphosphate
PO^3	Phosphate
K	Potassium
Cl	Chloride
Ca	Calcium
Mg	Magnisium
CKDmfo	chronic kidney disease of multifactorial origin
KSD	Kidney stone disease

IDD	Iodinedeficiency disorders
CKD	Chronic kidney disease
Egfr	Estimated glomerular filtration rate
OPC	Outpatient clinic
RBCs	Red blood cells
MDRD	Modification of Diet in Renal Disease

ABSTRACT

Background : This study was performed to assess the possible association between groundwater and kidney disease in new valley governorate .

Methods : This hospital-based cross-sectional observational study was conducted at the Department of Nephrology, Ain Shams University, Cairo, Egypt, during the period from August 2018 to January 2019. After obtaining verbal consent from all participants; the general information of each participant was recorded, full history taken and general examination was done for each participant, then urine samples and serum blood samples taken for urine analysis, serum urea and serum creatinine, then estimated glomulurar filtratin rate (eGFR) was calculated for healthy subjects groups using MDRD Equation; after that three different groundwater samples and Nile water sample collected and analyzed for different solutes and heavy metals contents.

Result: Our data suggests that rural community as in Eldakhla; which depends on groundwater supply may affected by more risk of CKD than urban community as in Cairo city, which depends on Nile water supply.

Conclusion : there are increased prevalence of CKD in New Valley governorate and this may be due to groundwater consumption .

Keywords: New valley governorate,groundwater,chronic kidney disease.

Introduction

Groundwater having complex contaminant sources were investigated, these investigations were done on heavy metals loads and other hydrochemical constituents. it was found that Na^+, K^+, and Ca^{2+} ions are the dominant cations in the groundwater, while HCO_3^-, F^- and Cl^- ions dominate the anionic part of the groundwater. Compositional analysis for heavy metals has identified that groundwater can be contaminated by cadmium, Lead and Chromium elements. Heavy metals are considered as a threat for human population because they have the tendency to accumulate in the body and cause variety of diseases affecting liver and kidney, as well as associated with cancer.(**Singh.2018**)

Moreover Groundwater used for drinking has been shown to be contaminated with naturally occurring inorganic arsenic and other metals, Metal-contaminated drinking water is the biggest threat to public health in some countries such as Bangladesh. Toxic metals present in the drinking water have a strong relationship with chronic diseases in humans.(**Chandrajith,2011- Cárdenas,2013- Panhwar,2016- Abeywickarama,2016- Jinlong,2017- Tanu,et,al.,2018- Edirisinghe,2018-).**

Groundwater will normally look clear and clean because the ground naturally filters out particulate matter. But, natural and human-induced chemicals can be found in groundwater. As

groundwater flows through the ground, metals such as iron and manganese are dissolved and may later be found in high concentrations in the water.(**U.S Department of the Interior,2016).**

Iron is the most common water problem dealt with by homeowners with well water. Unfortunately, iron is also difficult to treat to a satisfactory level (**WellWaterGuide.net,2017**).

Aim of the work

1-To determine the possible association between groundwater consumption and kidney disease in New Valley.

2-To analyze the groundwater elements in New Valley compared to Nile water.

Chapter (1)

Groundwater Potentiality and Suitability for Drinking in the New Valley

Egypt is facing increasing water demand by the rapidly growing population, increased urbanizations, higher standards of living and the agricultural policy which emphasizes expanding crop production in order to feed the growing population. The Western Desert of Egypt is considered as important area for expansion depending on the groundwater resources. The groundwater needs more studies regarding its quantity, quality and sustainability for irrigation and drinking purposes. The Nubian sandstone aquifer system (NSAS) is considered as one of the most significant and drinkable groundwater basins in the world; it is the only water resource for most of the areas sharing its valuable reserve. It extends over a vast area in Egypt, Libya, Sudan and Chad. The area occupied by the aquifer extends between lat 15° and 25° N and long 20° and 35 ° E. The area of the Nubian aquifer system of Eastern Sahara is about 2.35 millionskm2. It encompasses some 850000 km2in Egypt (670000 km2 in Western Desert, including the area known as Wadi Elgidid (New Valley).

Location of study area:

The New Valley located on the south western part of Egypt (Figure 1), shares the international borders with Libya to the west and Sudan to the south. It is divided into 5 counties (marakzs) which comprise 5 cities, 37local units and 164 villages. The area of the New Valley is about 440,098 km2, equivalent to 44% of the total area of Egypt and about 66% of the area of Western Sahara. It includes El Kharga, Baris, El Dakhla, Gharb Elmohoub, Abo Monqar and El Farafra Oasis.

The results of the census in 1996 that the population had reached 141,774 people, an the rate of population growth was 2.3%. In 2010, the population density on the total area is 0.5 per one km2 and on the inhabited area of 166 inhabitants per 1 km2. The present study deals mainly with the El Kharga and El Dakhla Oases which are considered the major Oases in the New Valley governorate. El Kharga Oasis is located about 230 km South-West of Assiut occupying about 86223 km2 with the population reached 80173 persons (2010). El Dakhla Oasis is located about 190 km west of El Kharga Oasis.

The area of El Dakhla is about 120438 km2 with population number of 81981 persons. El Dakhla Oasis was subdivided recently to El DakhlaandBalaat.