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**Assessment of the Self-medication with antibiotics behaviors At Khartoum  
Locality, Sudan,2021.**

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

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## DEDICATION

Honor must be given to whom it is due, we are very much grateful and happy to

*dedicate this work to our beloved:*

### **Mothers and Fathers**

Whose love, affection, their endless supports, prayers and encouragements made

*this work successful, acceptable valuable and useful*

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## **LIST OF ABBREVIATIONS**

<b>SMA</b>	<b>Self-medication with antibiotics</b>
<b>CDC</b>	<b>The Centers for Disease Control and Prevention</b>
<b>AMR</b>	<b>Antimicrobial resistance</b>
<b>SPSS</b>	<b>Statistical Package for the Social Sciences</b>
<b>CDC</b>	<b>Centers for Disease Control</b>
<b>PKA</b>	<b>Prior Knowledge of Antibiotics</b>
<b>KAP</b>	<b>Knowledge , Attitudes , and Practices</b>

## Abstract

**Background:** Self-medication is one of the forms of irrational use of antibiotics. Antibiotics are the most commonly self-medicated drug in many parts of the world. Most oral antibiotics used worldwide are obtained without a prescription.

**The objectives:** To assess the Self-medication with antibiotics behaviors and Sudanese knowledge toward the effectiveness of antibiotics and antibiotics resistance.

**Method:** A cross-sectional descriptive study data were collected through direct face-to-face interviews using a questionnaire. This study was conducted in Khartoum Locality in 3 selected pharmacies, data were collected on socio-demographics, participant's adherence, and attitude toward the practice of self-medication with antibiotics, and participant's knowledge toward the effectiveness of antibiotics and antibiotics resistance. Data were analyzed using the SPSS program and Microsoft Excel, and the p-value was  $<0.05$ .

**Results:** One half of study participants (50%) stated that the previous time of self-medication with antibiotics used was in more than a month. Participants (38%) aged more than 40 years old used antibiotics to treat sore throat and flu symptoms (p-value=0.000). 50% of participants aged (18-30) years old (p-value=0.000) and 35% of university student participants (p-value=0.000) were obtained antibiotics from pharmacy. Regarding participants' knowledge, (62%) of participants stated that they had known poor information about antibiotic resistance. [n=40; (80%)] of them were believed that antibiotics kill viruses, although 60% of respondents were known that imprudent use of antibiotics leads to antimicrobial resistance. 52% of were aged from (31-40) years had used social media as a source of their information about self-medication with antibiotics and antibiotics resistance (p-value=0.000).

**Conclusion:** The current findings have revealed unsatisfying level of knowledge, and practice about self-medication with antibiotics and antibiotics resistance. Inappropriate antibiotic use is highly prevalent, although a positive trend in attitudes and adherence in continue to take the medicinal dose at the specified time daily. 62% of male unemployed or retired participants when felt better were discontinued take the antibiotics (p-value=0.000). The study highly recommends the Ministry of Health to recognize educational campaigns for public Sudanese because it's important in different aspects.

**Keywords:** self-medication with antibiotics, antibiotics resistance, level of knowledge.

## ملخص الدراسة

**الخلفية:** العلاج الذاتي هو أحد أشكال الاستخدام غير رشيد للمضادات الحيوية. المضادات الحيوية هي أكثر العقاقير التي يتم استخدامها للعلاج ذاتي في العديد من أنحاء العالم. يتم الحصول على معظم المضادات الحيوية الفموية المستخدمة في جميع أنحاء العالم بدون وصفة طبية.

**الأهداف:** لتقييم العلاج الذاتي والمعرفة السودانيين تجاه فاعلية المضادات الحيوية ومقاومة المضادات الحيوية و سلوكيات المشتركين اتجاه استخدام المضادات الحيوية.

**الطريقة:** في هذه الدراسة الوصفية والمقطعية ، تم جمع البيانات بشكل عشوائي من خلال المقابلات وجهًا لوجه باستخدام الاستبيان. أجريت هذه الدراسة بمحلية الخرطوم في 3 صيدليات تم الوصول إليها ، تم جمع البيانات عن الخصائص الاجتماعية ، والتزام المشاركين وموقفهم تجاه ممارسة العلاج الذاتي بالمضادات الحيوية ، ومعرفة المشاركين تجاه فعالية المضادات الحيوية ومقاومة المضادات الحيوية. تم تحليل البيانات باستخدام برنامج SPSS و برنامج مايكروسوفت اكسل، وكانت القيمة ( $p > 0.05$ )

**النتائج:** من بين 50 من المشاركين ، (50%) من المشتركين الذكور قالو أنهم استخدموا العلاج الذاتي بالمضادات الحيوية في اكثر من شهر سابق. 38% من المشاركين الذين تزيد أعمارهم عن 40 عامًا استخدموا المضادات الحيوية لعلاج التهاب الحلق وأعراض الأنفلونزا (القيمة الاحتمالية = 0.000). 50% من المشاركين الذين تتراوح أعمارهم بين (18-30) سنة (القيمة الاحتمالية = 0.000) و 35% من الطلاب الجامعيين المشاركين (القيمة الاحتمالية = 0.000) حصلوا على المضادات الحيوية من الصيدليات. فيما يتعلق بمعرفة المشاركين ، (62%) من الذكور المشاركين قالو أن معلوماتهم ضعيفة عن مقاومة المضادات الحيوية. (80%) منهم كانوا يعتقدون أن المضادات الحيوية تقتل الفيروسات. علي الرغم من ذلك 60% من المستجيبين عرفوا أن الاستخدام غير الحكيم للمضادات الحيوية يؤدي إلى مقاومة مضادات الميكروبات. 52% تتراوح أعمارهم بين (31-40) سنة استخدموا وسائل التواصل الاجتماعي كمصدر لمعلوماتهم حول العلاج الذاتي مع المضادات الحيوية ومقاومة المضادات الحيوية (القيمة الاحتمالية = 0.000).

**الخلاصة:** كشفت النتائج عن مستوى الغير مرضي من المعرفة، واستخدام العلاج الذاتي للمضادات الحيوية ومقاومة المضادات الحيوية. ينتشر الاستخدام غير المناسب للمضادات الحيوية بشكل كبير ، على الرغم من وجود اتجاه إيجابي في المواقف والالتزام في الاستمرار في تناول الجرعة الدوائية في الوقت المحدد يوميًا. 62% من المشاركين الذكور العاطلين عن العمل أو المتقاعدين عندما شعروا بتحسن توقعوا عن تناول المضادات الحيوية (القيمة الاحتمالية = 0.000). توصي الدراسة بشدة وزارة الصحة بالاعتراف بالحملات التعليمية للجمهور السوداني لأنها مهمة في جوانب مختلفة.

**الكلمات الرئيسية:** العلاج الذاتي بالمضادات الحيوية ، ومقاومة المضادات الحيوية ، ومستوى المعرفة.

# Chapter one

## Introduction

### 1.1 Background:

In the modern century, the emergence and spread of bacterial resistance to antibiotics is a persisting problem globally, which presents a significant warning to public health (1) (2). The decreasing effectiveness of antibiotics in treating common infections has quickened in recent years, and with the arrival of untreatable strains of carbapenem-resistant Enterobacteriaceae, we are at the dawn of a postantibiotic era (3).

Unfortunately, the increasing use of antibiotics during the past 50 years have promoted the growth and survival of resistant strains', which may be resistant to several types of antibiotics (4). Self-medication is one of the forms of irrational use of antibiotics (5). Self-medication with antibiotics (SMA), the most commonly self-medicated drug in many parts of the world, with a wide variation between countries and regions. It is estimated that nearly two-thirds of all oral antibiotics used worldwide are obtained without a prescription (6).

The increase of antibiotics resistance will threaten the therapeutic effectiveness, and lead higher costs and mortality rates (1). Moreover, the inappropriate and excessive uses of antibiotics play key factors in the increase and spread of resistance (7). There are many factors such as medical behavior, patient knowledge, and behavior (8) (9).

### 1.2 Problem Statement:

In Sudan, the current situation of antimicrobial use is not setting well. Moreover, antimicrobial agents can be easily reached over the counter from pharmacies, general stores, and market stalls. Also, there are not many studies on antibiotic use or resistance and most of the available studies are carried by individual (11). Substantial evidence has shown that the general community plays a role in the increase and spread of antibiotic resistance. Therefore, the control of antibiotic utilization needs multifaceted interventions involving knowledgeable and engaged healthcare practitioners and the public.

In many developing countries, self-medication is common practice because of concerns related to the quality of health care delivery systems and skepticism about the benefits of professional health care vis-a-vis traditional medicine (9).

The emergence and spread of bacterial resistance to antibiotics is a growing problem worldwide due to patient's self-medication behavior, which presents a significant threat to public health globally in the 21st century. The Centers for Disease Control and Prevention (CDC) has listed various bacteria for generating multidrug resistance overtime versus antibiotic drugs as a consequence of which an individual is reported to a higher risk of infection, and a shortage of treatment alternatives make the healing method severe and complex (10).

Based on the problem statement, the following research questions are formulated:

- Do Sudanese patient's adherence to appropriated practice of antibiotic?
- Do Sudanese patients have good knowledge, attitude and practice toward antibiotics use?
- Are there relation between self-medication with antibiotics (SMA) and Sudanese patient's attitude and adherence toward use antibiotics?
- Do Sudanese patient's self-medication with antibiotics (SMA) behavior lead to antibiotic resistance?
- What are information sources of Sudanese patients?

### **1.3 Justifications:**

Self-medication of antibiotics is a concerning behavior and can lead to the indiscriminate use of drugs, incorrect dosages and incomplete courses, all of which are associated with an increased risk of resistance.

Non-adherence to antibiotic regimens and inappropriate antibiotic use are strongly associated with public awareness and knowledge of antibiotics. Several studies have discussed the correlation between the patients' perceptions of antibiotic and the behavior of using antibiotic self-medicating behavior.

Resistance to antibiotics is a major threat to global health and general public play a significant role in the fight against antimicrobial resistance. However, the previous studies worldwide have contributed to understand the relation between antibiotics resistance and patient attitude and adherence toward practice of antibiotic. In spite of there are previous studies conducted worldwide, there is lack of studies addressed self-medication with antibiotics (SMA) in Sudan. Hence, this study is needed to conduct.

An understanding of this topic will provide important information towards understanding its pharmaco-economics and burden on the national health systems.

## **1.4 Objectives**

### **1.4.1 General objective:**

To assess Self-medication with antibiotics behaviors At Khartoum Locality, Sudan,2021.

### **1.4.2 Specific objectives:**

- To assess the Sudanese participants self-medication with antibiotics behavior (SMA).
- To identify Sudanese participants knowledge toward the effectiveness of antibiotics.
- To identify attitude and adherence of Sudanese participants toward self-treatment with antibiotics.
- To assess the association between self-medication with antibiotics (SMA) with Sudanese socio-democratic characteristics.

## **Chapter two**

### **Literature review**

#### **2.1 Definition:**

Self-medication refers to the medicine used to treat self-diagnosed disorders or symptoms, without medical supervision, (6) .

Self-medication is one of the forms of irrational use of antibiotics (5). Self-medication with antibiotics (SMA), antibiotics are the most commonly self-medicated drug in many parts of the world, with a wide variation between countries and regions. It is estimated that nearly two-thirds of all oral antibiotics used worldwide are obtained without a prescription (6).

Antimicrobial resistance (AMR) is a global health economic problem, and both intention to self-medicate with antimicrobials or monitoring reports show a high prevalence of AMR actual self-medication with antimicrobials (12).

#### **2.2 Epidemiology:**

The World Health Organization counted that, over 25,000 people every year in European hospitals die because of antibiotic resistance. The Centers for Disease Control and Prevention (CDC) has classified many bacteria for developing multidrug resistance overtime against antibiotic drugs as a sequenced of the individual is exposed to a higher risk of infection and a lack of treatment choices make the recovery process complicated and dangerous (10). It has estimated that each year in the USA, at least 2 million people are affected by antibiotic-resistant pathology, and approximately 23,000 people die each year as a direct result of infections (Gualano M.R et al, 2015).

It is estimated that by 2050, the world's population will be declined by between 11 million and 444 million, and the global economy will be reduced by 0.1–3.1% without effective antibiotics (6).

Self-treatment has existed long before professional health care. An estimated 70%–95% of all illnesses are managed without the intervention of a physician (14).

In many developing countries, self-medication is common practice because of concerns related to the quality of health care delivery systems and skepticism about the benefits of professional health care vis-a-vis traditional medicine (9)

### **2.3 Reasons of inappropriate antibiotic use and self-medication behavior:**

The reasons inappropriate are complex. Antibiotics are important in acting against infections. Though, antimicrobial resistance is a growing issue. Investigation of factors determining appropriate antibiotic use is considered as the main reason to decline incidents of antibiotics resistance. There are many factors such as medical behavior if they are well attuned to prescribe antibiotics, patient knowledge, and behavior (8) (9).

This increase can be associated with low knowledge of patients on the issue of antibiotic resistance and improper attitudes towards usage like self-medication (11). In high-income countries, continued high rates of antibiotic use in hospitals, the community have contributed to selection pressure that has sustained resistant strains, forcing a shift to more expensive and more broad-spectrum antibiotics. In low- income and middle-income countries , antibiotic use is increasing with rising incomes, high rates of hospitalization, and a high prevalence of hospital infections (3) (15).

### **2.4 Impaction of antibiotic resistance worldwide:**

In the absence of the development of new generations of antibiotic drugs, appropriate use of existing antibiotics, the development of the newly emerging infectious diseases have a seriously threatened impaction on increased morbidity, especially when antibiotics become ineffective.

Unfortunately, increases the usage of antibiotics during the past 50 years have promoted the growth and survival of resistant strains', which may be resistant to several types of antibiotics (4).

### **2.5 How antibiotics resistance grew:**

The imprudent use of antibiotics may result from a complex interaction between various factors, such as prescribers' knowledge and experiences, diagnostic uncertainty, perceptions of patients about the patient-prescriber interaction, and insufficient patient education by



physicians (1). Therefore, the inappropriate and excessive uses of antibiotics play key factors in the increase and spread of resistance (7)

The improper use of antibiotics may arise from a complex interaction between numerous factors, such as:

- 1- Prescribers' knowledge and experiences.
- 2- Diagnosis.
- 3- Perceptions of patients concerning the patient-prescriber interaction.
- 4- Insufficient patient education by physicians.
- 5- Patients' knowledge, beliefs, and attitudes toward antibiotic use.
- 6- Self-medication, patients' expectations.
- 7- Patients' experience with antibiotics (8)

## **2.6 Rational antibiotic use in the community:**

A rational antibiotic use in the community should include a wide range of settings, such as ambulatory care facilities, pharmacies, drug vendor outlets, households, and agriculture. Over-use and irrational use of antibiotics, either driven by the supply or demand sides. On the supply side, physicians are often role models for other health professionals and patient's resistance and lowering of antibiotic use among consumers and prescribers (3).

## **2.7 The influence of community pharmacies on rising resistance of the human pathogens:**

The lenient behavior of community pharmacies( who counsel patients about prescriptions) in concerns to dispensing antibiotics together with the expendable prescribing of antibiotics by physicians' results in unlimited and excessive use that, in aid to increases the resistance of the human pathogens. The common antibiotics using globally significantly in developing countries, maximize the antimicrobial resistance of the pathogen as the choices of effective antibiotics that are readily used to treat serious infections are narrowing. It is estimated that in some developing countries, 20.0% of antibiotics are used in hospitals and health care

facilities while 80.0% are used in the community via prescription by a health care provider (5).

## **2.8 Risks of increasing antibiotic resistance:**

The increase of antibiotics resistance will threaten the therapeutic effectiveness, increase treatment failures, and, as a result, lead to longer and more severe illness episodes with higher costs and mortality rates (1).

## **2.9 The effect of increasing of antibiotic resistant's on medical services:**

The world essentially requires improving the way of utilizing antibiotics and prescribes. Antibiotic resistance leads to higher medical costs, extended hospital stays, and raised mortality rates (11).

## **2.10 Previous studies:**

The development of antibiotic resistance is one of the serious global health issues. General public awareness plays a significant role in the fight against antimicrobial resistance. Inappropriate use of antibiotics is a leading cause of antibiotic resistance. The high-level knowledge of ill individuals has important role in increases awareness to seek professional health care and avoid self-medication with antibiotics.

A quantitative survey was conducted in Nepal; it was aimed to explore the knowledge, attitudes and practices (KAP) towards antibiotic use among adults. The results of this study were reported that among 220 participants, females participants were formed [n=119; (54.1%)] and males were formed [n=101; (46.9%)], most respondents with in age group (35-44) years old [n= 81; (6.8%)] and [n=50; (22%)] were age (25—34) years old. Almost 60% of respondents lived in rural areas and they had achieved a level of education of primary/secondary school level [n=69; (31.4%)], high school/intermediate level [n=66; (30.0%)] or bachelors and above level [n=47; (21.4%)]. Respondents had relatively good knowledge about aspects of antibiotic use other than identifying antibiotics. Nearly half (47.7%) believed antibiotics helped them get better more quickly if they had a fever. Most respondents reported correct practices accessing and using antibiotics, however, 84.6% at least sometimes preferred an antibiotic when they have a cough and sore throat. Females were more likely to report better practices. The level of knowledge about antibiotics use was better for respondents with higher levels of education ( $p = < 0.001$ ). Attitudes to antibiotic

use was significantly associated with education level ( $p = < 0.001$ ). Practices in relation to antibiotic use were significantly associated with gender ( $p = 0.014$ ), age group ( $p = 0.001$ ) and education level ( $p = < 0.001$ ). The summarization of study findings was useful in designing effective and targeted interventions to decrease misconceptions about antibiotic use and to increase awareness about the risks of inappropriate use of antibiotics in the community (16).

A cross-sectional survey was conducted in China. The study aimed to identify the knowledge, attitudes, and practice of the general public toward self-medication with antibiotics and compliance with antibiotic regimens. The results of this study showed that within 1204 participants, the gender of respondents were distributed almost equally [ $n=622$ ; (51.7%)] were male and [ $n=582$ ; (48.3%)] were female. The majority of respondents had completed high school [ $n=969$ ; (80.5%)] and were employed or self-employed [ $n=774$ ; (64.3%)]. There were significant differences in knowledge scores between participants in age groups ( $P<0.001$ ), education level ( $P<0.001$ ) and employment status ( $P<0.001$ ). When investigated recent use of antibiotics, 550 (45.7%) respondents stated they had used antimicrobials in the last 6 months, while 352 (64.0%) respondents had self-medicated. Self-medication was significantly influenced by age ( $P = 0.009$ ). The main source of self-medicated antibiotics was retail pharmacies [ $n=442$ ; (80.2%)]. Other sources included leftover medication from a previous prescription [ $n=97$ ; (17.8%)] and friends [ $n=11$ ; (2.0%)]. A cough, sore throat, and bronchitis were the most frequent reasons reported for antibiotic use, followed by a runny nose, nasal congestion, fever and toothache. This study identified some confusion surrounding the role of antibiotics. Just over half [ $n = 659$ ; (54.8%)] of participants incorrectly agreed that “antibiotics are effective against viral infections”. In the section assessing attitude, it was associated with age ( $P<0.001$ ), education level ( $P<0.001$ ), employment status ( $P = 0.002$ ). A small proportion ( $n = 174$ ; 14.4%) incorrectly believed that antibiotics can be used immediately to treat the common cold. Furthermore, less than one-third (28.8%) of respondents stated they had finished the full course of antibiotic treatment. However, the study participants demonstrated poor knowledge about the use of antibiotics. Just over half of participants ( $n = 687$ ; 57.1%) agreed with the statement “It is okay to stop taking an antibiotic when symptoms are improving”. 33.4% had not finished the full treatment course. This study concluded respondents have poor knowledge towards antibiotics. Effective interventions should be developed to provide practical and appropriate advice to effect behavior change within this population (6).

In Poland, the cross-sectional study was carried out with purpose of assessed knowledge by the general public regarding antibiotics, AMR among the general public. The results of study was documented that among 5004 participants were included, [n=2243; (44.8)] were male and [n=2761; (55.2)] were female. [n=1508; (30.1)] of participants were age from 45 to 59 years old and [n=1284; (25.7)] of participants were age 60 and above years old. [n=2195; (43.9)] of participants had secondary education and [n=1442; (28.8)] of participants had University education. Employed participants was formed [n=2402 (48.0)], unemployed participants [n=473; (9.5)], and [n=1761; (35.2)] of participants were retired. That prospective study reported that participants mentioned took antibiotics during the year in 40% to treat their common cold, sore throat, flu, and cough. According to knowledge about antibiotics, 60% of respondents believed that antibiotics kill viruses. Respondents with higher education level (46%) more frequently gave the appropriate answer compared with respondents with primary education (8.7%, OR = 0.11, 95% CI = 0.07–0.17). Males (66%) more often than females (56%), declared that antibiotics were active against viruses (OR = 1.64, 95% CI = 1.44–1.86). The same opinion was also expressed by the younger respondents and those with lower education. The numbers of respondents who believed that antibiotics kill viruses decreased with age. Many of the respondents believed that antibiotics are effective against flu (49%) and colds (36%). A greater number of males than females believed that antibiotics are effective against the cold (OR = 2.16, 95% CI = 1.88–2.48) and flu (OR = 2.2, 95% CI = 1.91–2.54). This opinion was more likely expressed by younger respondents between the age of 18–24 than older ones (e.g. flu respondents > 60 OR = 0.19, 95% CI = 0.13–0.28) and with lower education compared to those with higher level (e.g. flu OR = 3.53, 95% CI = 2.62–4.76). In the five waves of the study the respondents were asked if it was true or false that imprudent use of antibiotics leads to antimicrobial resistance. A large majority (86%) of those polled gave the correct answer. Regarding to attitude toward antibiotic use, approximately 41% of the respondents expected a prescription for an antibiotic against flu. Males were more likely than females to expect an antibiotic prescription for flu (47% and 36%, OR = 1.54, 95% CI = 1.36–1.74) and common cold (21% and 17%, OR = 1.42, 95% CI = 1.23–1.66). The survey was asked how the respondents obtained the course of antibiotics they used. Almost all (90%) of the respondents said that they had obtained their last course of antibiotics from a physician's prescription. Only 3% of respondents stated that they had acquired an antibiotic from a pharmacy without a prescription. The majority of the respondents (79%) had taken the full dose of the antibiotic prescribed. The most common

reason for stopping antibiotic treatment early was resolution of symptoms (47%). More males (54%) than females (39%) claimed to have stopped taking antibiotics due to a relief in symptoms (OR = 1.94, 95%CI = 1.27–2.97). Additionally, young people 18–24 (41%) including high school/university students (38%) were less likely than older respondents (15%) to take the full dose of the antibiotic prescribed (OR = 0.28, 95% CI = 0.17–0.45). In the fifth wave of the survey, the respondents were additionally asked if the current use of antibiotics should be restricted in order to keep them effective in the future. Most respondents thought antibiotic use should be limited so that they could still be used effectively in the future (82%), while 3% claimed they had no knowledge on the matter. According to sources of information, 10% of respondents indicated having searched for any information about antibiotics. The most commonly indicated sources of knowledge were: websites dedicated to health (57%), health magazines (36%), health encyclopedias (33%), information from physicians (32%) and family and friends (19%). Respondents older than 60 less frequently than in other age groups searched information on the Internet (OR = 0.16, 95% CI = 0.08–0.32). The conclusion of this study was inappropriate antibiotic use is still highly prevalent in Poland, although a positive trend in behavioral change was observed after the educational campaigns (17).

Another study in China was carried out with aim of analyzed the trends of and factors related to self-treatment. Self-treatment was measured based the concept and data of the China National Health Survey (CNHS). The results of this study was stated that in 2018, male was formed (26.9%) while female was formed (27.2%). (20.4%) of participants were aged 45-64 years old, (27.0%) were aged 25-44 years old, and (29.6%) were aged 15–24 years. (28.6%) of participants were finished their primary/junior school, (28.5%) of participants were at high or technical school and (27.8%) of participants were at college or university and above. (29.9%) participants were unemployed, (30.0 %) participants were employed, and (26.0 %) participants were retired. The proportion of survey respondents who had opted for self-treatment of their symptom or complaint during the 2-week period preceding the survey was (27%) in 2008 more urban residents reported self-treating than rural residents ( $p \leq 0.01$ ). The self-treatment behavior differs according to age, profession, and number of family members. There were a significantly larger proportion of respondents opting for self-treatment in the higher age and education categories. Significantly greater proportions of working and retired respondents opted for self-treatment compared with respondents who were unemployed. There were significant differences in the proportion opting for self-treatment each year

according to illness symptom, severity and duration (both  $p \leq 0.01$ ). Compared with unemployed respondents, workers were more likely to self-treat. (29.1 %) of participants were used self-medication to treat pain, while (20.8%) of them use it for fever treatment. This study was concluded that self-treatment and professional medical services have shared the incremental medical needs of residents in China. Self-perceived illness status, economic circumstances, and education play important roles in health care decision-making (14).

In International University of Africa, Medical complex, Sudan, the study was carried out with aimed to explore the attitude of students who are in their 3rd, 4th, or 5th years in IUA medical complex on antibiotic usage and knowledge on antibiotic resistance and relate these to gender, age and the cost of health-care in 2019. The results of this study were showed that among 306 of participants. Majority of the participants' age ranges between 21-24 years (71.9%) and only 14.1% the participants are aged 25 years and above and another 14.1% age between 17-20 years. 70.9% were male students and 29.1% female students. Most of the participants are from the faculty of pharmacy (30.1%), 27.1% are students from the faculty of medicine, 19.3% from faculty of dentistry while the faculties of nursing and medical lab sciences have the smallest number of participants (11.8%) and faculty of medicine. The participants had shown (44.44%) good knowledge on resistance respectively. However, only (24.8%) had a good attitude. [n=121 ;( 42.0%)] of participants think that antibiotics treat infections from fungi, virus and bacteria. [n=144; (48%)] of participants think that antibiotics should be stopped immediately when the patient is clinically improved to reduce the risk of resistance. [n= 96; (32.7%)] of participants were said that, they always stop taking the prescribed antibiotics after their symptoms improved. [n= 129; (43.6%)] of participants were said that, they always complete the course of the prescribed antibiotic treatment. [n= 153; (51.5%)] of participants were said that, they always take the correct dose of their antibiotics at the right time for the full duration. [n= 72(24.1%)] of participants were said that, they always save the remaining antibiotics for next time they get sick, while [n=46; (15.7%)] of participants were said that, they always give leftover medication to friends or family if they get sick. [n= 70; (20.5%)] of participants were said that, they always prefer taking an antibiotic when you have cough or sore throat. The conclusion of study was the students attitude is average despite having good knowledge and students characteristics like age, gender and health care cost have negligible impact on the students' knowledge and attitude (11).

In Kuwait, a cross-sectional survey was performed with aimed of determine knowledge, attitude and practice towards antibiotic use. The results of this study were reported that within 770 randomly selected Kuwaiti individuals. The response rate was 88.3%. Nearly three-quarters (72.8%) of respondents had been prescribed antibiotics within 12 months prior to the study period. Almost 47% of participants had low knowledge regarding action, use, safety and resistance of antibiotics. Regarding respondents' knowledge regarding antibiotics, 246 (36.2%) of respondents were believed that antibiotics are effective against viruses. Over one-quarter (27.5%) were self-medicated with antibiotics to treat mainly common cold, sore throat and cough. Respondents level of agreement that doctors often prescribe antibiotics to meet the patient's expectation, and that doctors often take time to consider carefully the need for an antibiotic were 52.7% and 35.3%, respectively. According to respondents' attitudes towards use of antibiotics 369 (54.3%) of respondents were said that if they get side effects during a course of antibiotics treatment they stop taking them. 217 (31.9%) of respondents' were preferred to buy antibiotics from the pharmacy without a prescription, and (36%) of respondents' were stopped take antibiotics before completing the course of treatment and 117 (17.2%) of them stopped the took antibiotics when they feel better. The conclusions of this study were self-medication was more prevalent among those who were prescribed antibiotics and those who had attitudes to-wards using and accessing antibiotic inappropriately. Forty one percent of respondents had attitudes towards using and accessing antibiotic inappropriately. Better knowledge was found to be a predictor for positive attitude (1).

A cross-sectional study was performed in Vietnam. This study explores the awareness of antibiotic use and resistance among general people in highland provinces and detects associated factors. The results of this study were showed that 64.2% of people were aware of prescription drugs. More than two-thirds (67.4%) of participants were aware of antibiotic use, of whom only 55.8% were aware of AR. Higher age, education, and family income were positively associated with being aware of antibiotic resistant's. Females had a lower likelihood of being aware of antibiotic resistant's (OR=0.64; 95%CI=0.45-0.90) compared to male counterparts. This study concluded that a low awareness regarding prescription medicine, antibiotic use, and AR among public people in the highland provinces of Vietnam. Further systemic and didactic educational interventions targeting females, low education, low income, ethnic minorities, and those working in agriculture/fishery/forestry sector in this setting should be performed and evaluated to improve the awareness about antibiotic use and resistance (18).

Other study conducted in Southern China, the objective of this study was to evaluate knowledge and behaviors of university students and risk factors concerning SMA. The result of this study was reported that among 1,300 students of Shantou University (STU), 47.8% had self-treated with antibiotics. Logistic regression analysis identified prior knowledge of antibiotics (PKA), male students were form (47.4%) and female students were form (48.3%), (45.0%) of them were aged 22–23years and (36.8%) were aged 20–21years old. Most of them were studied in medicine school (59.2%). 379 (40.6) of participants were undergraduates. The result of this study was older age, and higher monthly allowance as independent risk factors for SMA. PKA significantly influenced students' knowledge about antibiotics, their uses, and common adverse reactions (all  $p= 0.05$ ). Among self-medicated students, 61.7% used antibiotics at least twice in the previous year. Community pharmacies were the major source of self-prescribed antibiotics. Reported common indications for SMA were sore throat (59.7%), fever (38.2%), cough (37.4%), runny nose (29.3%), and nasal congestion (28.7%). While 74.1% of self-medication episodes were based on students' own experiences, only 31.1% of students claimed to understand the package insert. Alteration of antibiotics and dosage during the course of self-treatment was made by 63.8% and 55.6% of students, respectively. At least two kinds of antibiotics were simultaneously taken by 82.6% of students. The majority of self-medicated students failed to complete the course of antibiotics. Adverse reactions were reported by 16.3% of students. (90.0%) of participants were said they had enough information about antibiotics. (32.4%) of participants believed that antibiotics are used for viral infections. The conclusions of this study were high prevalence of SMA was noted among STU students. Presence of risk factors and risk-associated behaviors/attitudes in the study population calls for focused educational intervention and stricter governmental legislation and regulation of antibiotic use and sale in pharmacies (19).

In Sudan, a descriptive cross-sectional study was performed with aimed of estimated the prevalence of self-medication with antibiotics and/or antimalarials and identify factors promoting such use among 5 universities students in Khartoum State, Sudan. The result of this study was with in1300 students, Eight hundred ninety-one (79.5%; 95% CI 77.0 to 81.8) students from the study population had used antibiotics or antimalarials without a prescription within 1–2 months prior to the study. Four hundred ninety (55%; 95% CI 51.7 to 58.3) of the respondents stated that they had used antibiotics, 39 (4.4%; 95% CI 3.2 to 6.0) had used antimalarials, and 362 (40.6%; 95% CI 37.4 to 43.9) had used both. Overall, self-medication with antibiotics or antimalarials was significantly more common among students 21 years of



age or older compared with those 20 years of age or younger (OR 1.55; 95% CI 1.15 to 2.09;  $p = 0.004$ ) and among students attending private universities compared with those attending public universities (OR 1.42; 95% CI 1.04 to 1.95;  $p = 0.028$ ). Self-medication with antibiotics followed a similar pattern, which was significantly more common among students 21 years of age or older (OR 1.36; 95% CI 1.03 to 1.81;  $p = 0.03$ ) and private university respondents (OR 1.52; 95% CI 1.15 to 2.02;  $p = 0.003$ ). Self-medication with antimalarials was found to be significantly less common among females (OR 0.76; 95% CI 0.59 to 0.97;  $p = 0.028$ ) and higher among the 21 years or older age group (OR 1.84; 95% CI 1.42 to 2.40;  $p < 0.001$ ). The most common reason indicated for self-medication was the respondents' previous experiences with similar ailments. The main source of drugs was community pharmacies. The conclusion of this study was the prevalence of self-medication with antibiotics/antimalarials among undergraduate university students in Khartoum State is high. Our findings highlight the need for planning interventions to promote the judicious use of antibiotics/antimicrobials (20).

A systematic review and proportion meta-analyses were performed through PubMed and Scopus scientific databases. The aim was to investigate knowledge about antibiotic use and antibiotic resistance. The results of this survey overall 26 studies have been selected for the systematic review, and 24 of these were included in the meta-analyses. A lack of knowledge about antibiotics was detected. In particular, 53.9% (95%CI 41.6–66.0) of them did not know that antibiotics are not useful against viruses. Besides, although 59.4% (95%CI 45.7–72.4) of the sample was aware of antibiotic resistance, 26.9% (95%CI 16.6–38.7) of them did not know that misuse of antibiotics can lead to this problem. Finally, 47.1% (95%CI 36.1–58.2) of the subjects stop taking antibiotics when they start feeling better. The conclusion of this study was it would be necessary to strengthen educational initiatives in the community and to push physicians to correctly inform patients in order to make them aware of the importance of a correct behavior concerning antibiotic consumption (13).

In Riyadh, Saudi Arabia, a cross-sectional study was conducted with aimed to assess the knowledge, attitude, and practice of antibiotics (ABs) use and misuse among Saudi adults. The result was reported that a total of 1966 questionnaires were completed (response rate: 93.5%). Sixty-seven percent of the respondents were unaware of the meaning of ABs resistance. Twenty-four percent believed that ABs worked on viruses, 31% on cold and 21% can cure cough. Almost 51% used ABs without physician prescription while 37.5% obtained ABs directly from pharmacists without physician's prescription. Almost 42% participants

discontinued ABs on alleviation of symptoms. There was significant difference in knowledge response of AB resistance and source of AB use ( $p=0.026$ ), reason of AB use ( $p=0.038$ ) and discontinuation of ABs ( $p=0.041$ ). the conclusion of this study was adults insufficient knowledge and understanding regarding the safe use of ABs consumption among the population (21).

In Jordan, a cross sectional survey was performed. The aim of this study was to assess knowledge, behavior and attitude toward antibiotics use among adult Jordanians. The result was demonstrated that among 1141 Jordanians adult, regarding their knowledge about the effectiveness of, resistance toward, and self-medication with antibiotics against bacterial, viral, and parasitic diseases. 67.1% believed that antibiotics treat common cold and cough. 28.1% misused antibiotics as analgesics. 11.9% of females showed inadequate knowledge about the safe use of antibiotics during pregnancy and nursing. 28.5% kept antibiotics at home for emergency use and 55.6% use them as prophylaxis against infections. 49.0% use left-over antibiotics without physicians' consultation while 51.8% use antibiotics based on relative advice. 22.9% of physicians prescribe antibiotics over the phone and >50.0% routinely prescribe antibiotics to treat common cold symptoms (15).

In Sudan, the other study was enrolled in all three cities of Khartoum State. The aim of this study was to estimate the prevalence of self-medication with proprietary medicines and herbs in Khartoum State, Sudan, and to evaluate factors associated with self-medication. The results of this study were showed that within 1,200 individuals, the response rate was (83.3%). (81.8%) of the respondents were used medicines without a medical consultation within 2 months prior to the study period. Proprietary medicines alone were used by 28.3% (CI: 25.6-31.2). Self-medication with proprietary medicines was least common with the middle-aged (OR: 0.12; 0.09-0.17), the elderly (OR: 0.29; 0.20-0.42) and low level of education [illiterate (OR: 0.26, 0.18-0.37) and primary/intermediate school (OR: 0.07, 0.04-0.11)]. It was most associated with low (OR: 5.3; 3.8-7.4) and middle income (OR: 4.3; 3.1-5.9), but no gender difference was found ( $P>0.05$ ). The conclusion was self-medication behavior varies significantly with a number of socio-economic characteristics. The findings have major public health policy implications for countries like Sudan (2).

The study has a cross-sectional was performed in Lilongwe, Malawi. This study aims to describe the knowledge, attitudes, and practices (KAP) regarding self-medication with antimicrobials. The finding of this study among 105 respondents, self-medication was

common, and the sources of these medicines were market vendors, pharmacies, drugs shared with friends and family and those leftover from previous treatments. KAP respondents had little knowledge of antimicrobials, their use, or any awareness of AMR. 92.4% wrongly responded that antimicrobials could be used to stop a fever. Concerning attitudes towards self-medication, over 54% wrongly believe that antimicrobials are effective in treating common colds. In regard to practice, 41% agreed that they must complete antibiotic therapy even if they are improving. Logistic regression analysis found that stocking antimicrobials at home for future use significantly promotes self-medication whereas an awareness of AMR would reduce self-medication. The conclusion of this study was self-medication is a public health risk that needs to be addressed urgently. Findings from this study point to the need for multifaceted interventions (12).

## **Chapter three**

### **Methodology**

#### **3.1 Study design:**

A Observational cross-sectional descriptive study.

#### **3.2 Study area and sitting:**

This study was conducted in Khartoum locality (in the middle of the populated areas in Sudan, at most the northeast center of the country between 15 and 16 degrees latitude north, and between 31 and 32 degrees longitude east , and has a population of 5,274,321), Three pharmacies were selected for the study randomly :

- A. Aydin pharmacy was located east Royal Care Hospital, Khartoum, Sudan.
- B. Wajah Al-Qamer pharmacy where located in berry Lamap, Khartoum, Sudan.
- C. Golden life pharmacy where located north Royal Care Hospital, Khartoum, Sudan.

#### **3.3 Study population:**

Adults attending to the pharmacies asking for drugs without prescriptions

##### **3.3.1 Inclusion criteria:**

- Adult's  $\geq 18$  years
- who are willing to participate were include.

##### **3. 3.2 Exclusion criteria:**

Health workers were excluded.

#### **3.4 Sample size:**

A convenient sample of 50 participates

#### **3.5 Tools and technique:**

Interviews using a questionnaire developed by the researcher .

### **3.5.1 Focus Group:**

Focus Group Discussion was conducted on March 2021. with 5 pharmacists participated.

### **3.6 Variables:**

**3.6.1** Dependent variable: use of drugs without prescription (self-treatment with antibiotics)

**3.6.2** Independent variable: lack of knowledge and awareness, source of information

**3.6.3** Background variable: age, gender, educational level, economical status

**3.6.4** Confounding variables: drugs for somebody else, drugs for business

### **3.7 Period of the study:**

Data collection started on January 2021, and finished in march 2021.

### **3.8 Data analysis:**

The data was analyzed by statistical package for social sciences version 21 and Microsoft Excel. Variables were demonstrated as frequency tables and charts, and the p-value was <0.05.

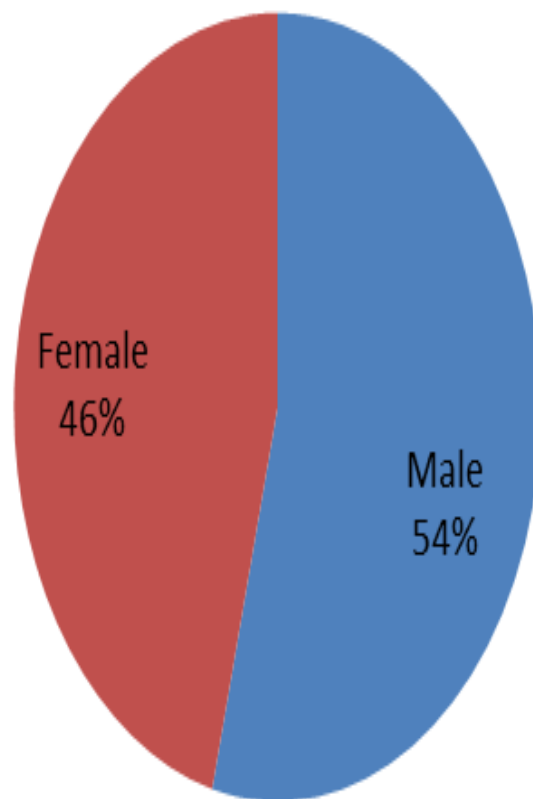
### **3.9 Ethical consideration:**

- Approval from Faculty of Medicine Ethical Committee
- Verbal consent from the participants

## Chapter four

### Result

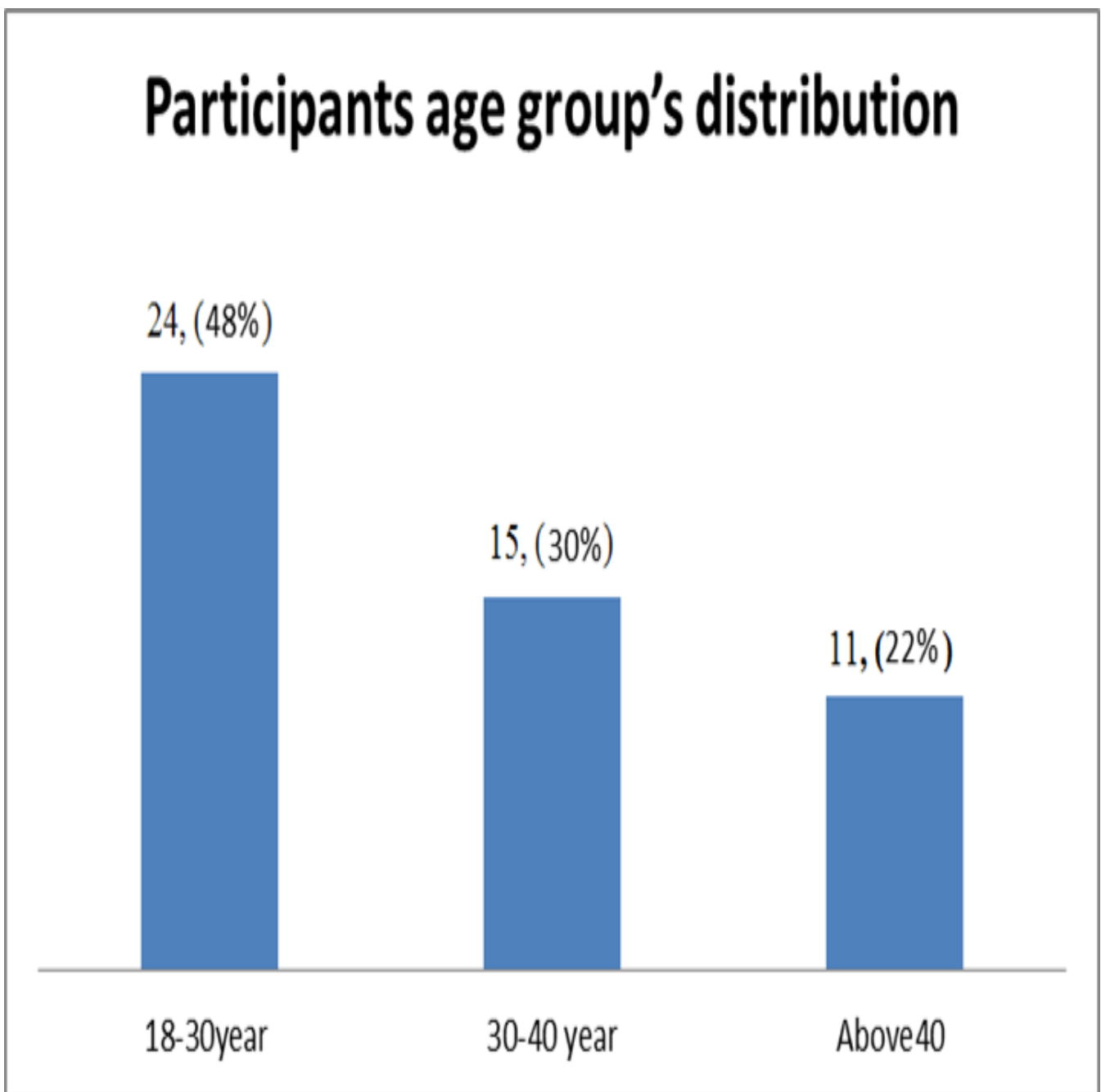
#### Participants gender distribution



**Figure 4.1: Participants gender distribution (n=50):**

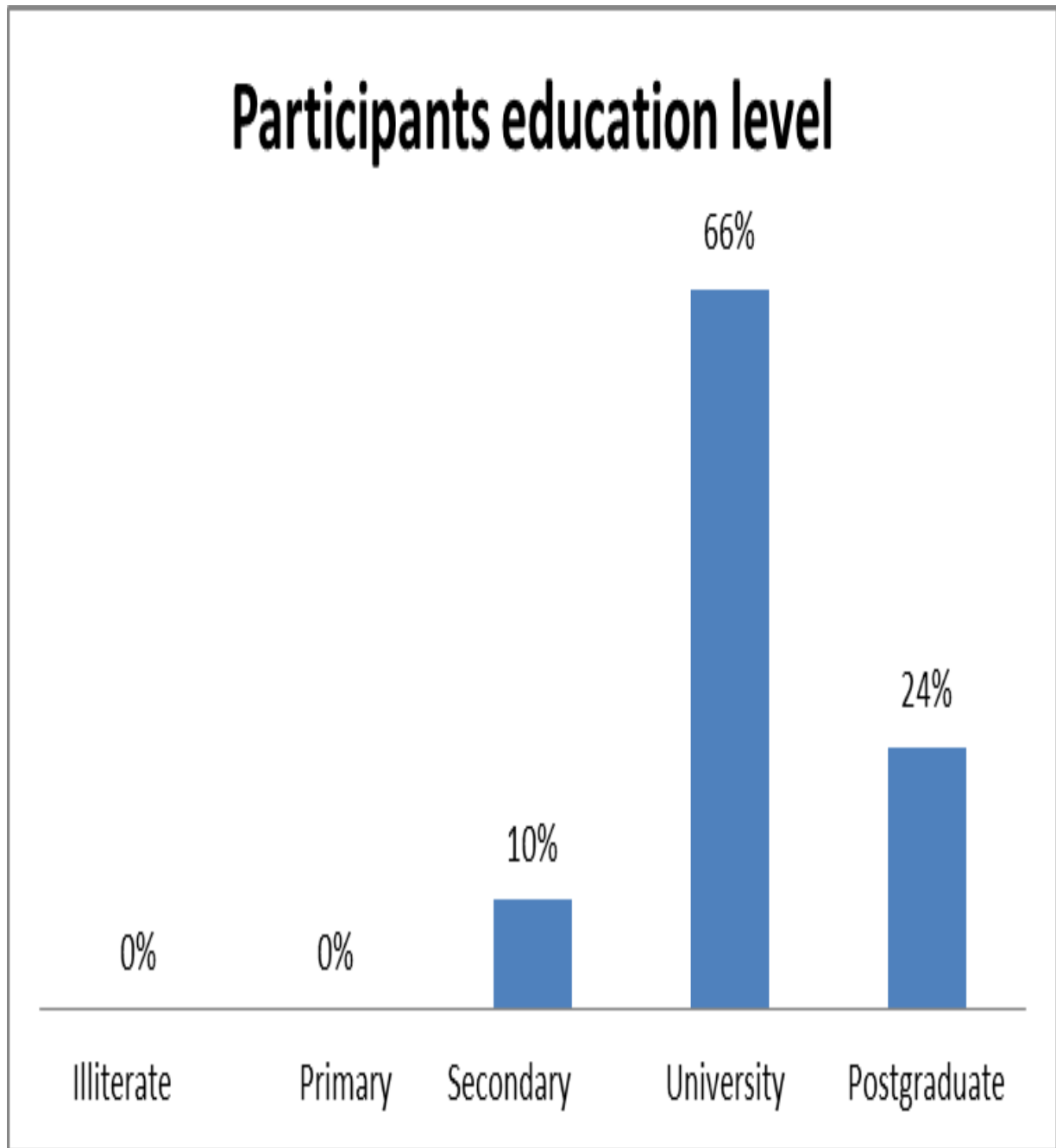
The majority of participants were males (54%)

## Participants age group's distribution



**Figure 4.2: Participants age group's distribution (n=50):**

48% of participants were aged within 18-30 years old.



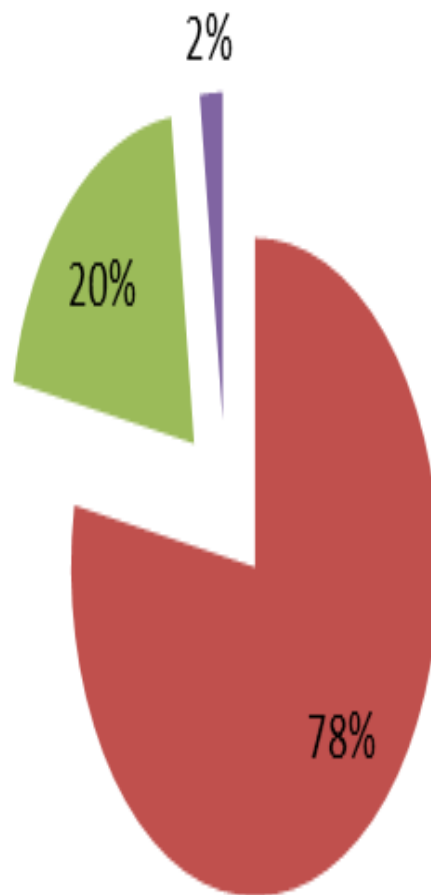
**Figure 4.3: Participants education level (n= 50):**

The majority of participants were get university education (66%)



# Participants employment status

■ Employed ■ Unemployed ■ Retired



**Figure 4.4: Participants employment status (n=50):**

The majority of participants were unemployed (78% )

**Tables 4.1: Self-medication with antibiotic's and use of antibiotics among participants (n=50):**

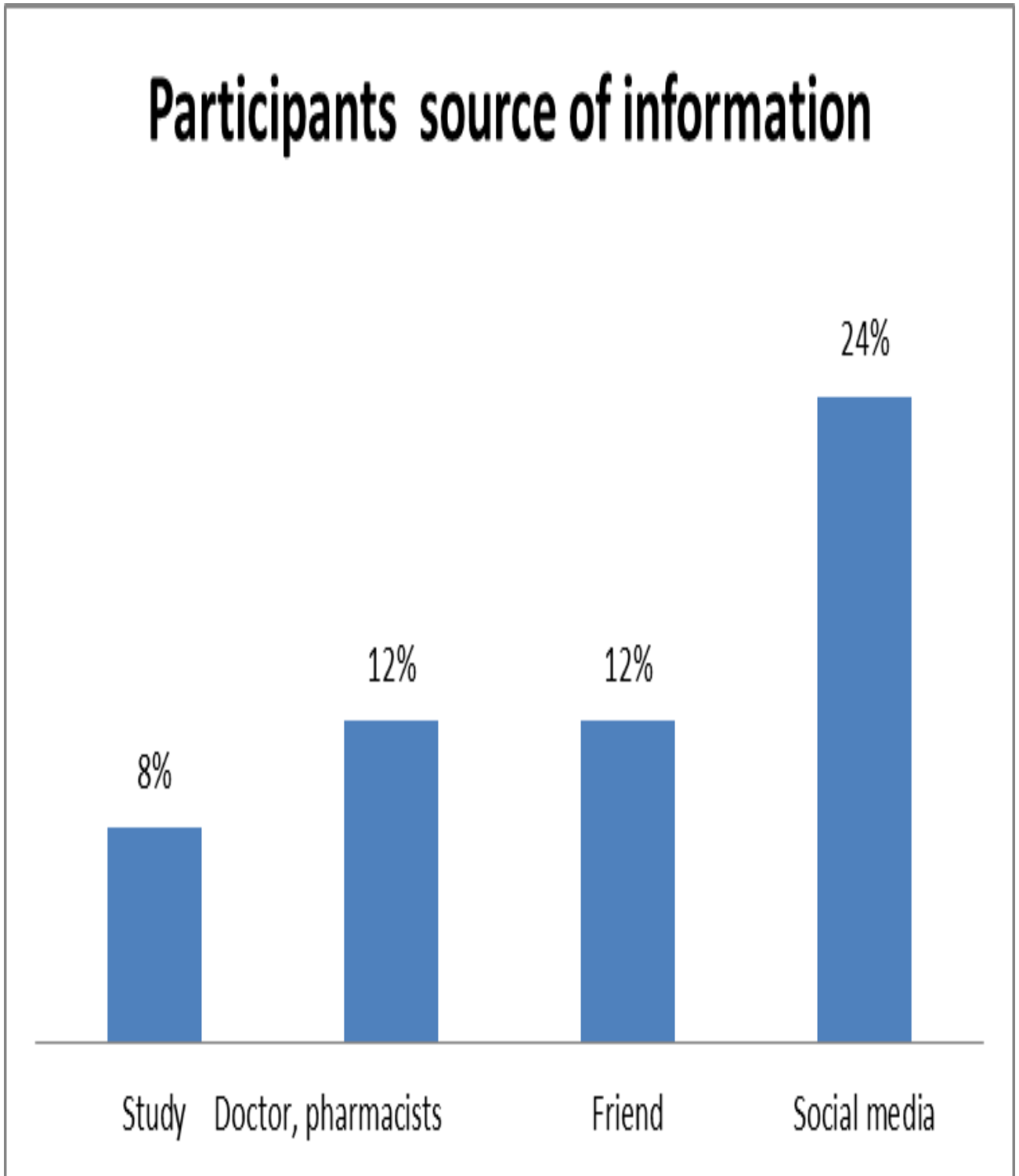
<b>Use of antibiotic</b>	<b>Answer</b>	<b>Frequency</b>	<b>Percentage</b>
Period of previous use of antibiotic	Week	10	20%
	Month	15	30%
	More than month	25	50%
	Total	50	100%
Cause of using antibiotics ( can select more than one)	Sore throat	33	66%
	Flu	32	64%
	Other	8	16%
Source of antibiotics ( can select more than one)	Pharmacy	48	96%
	someone give it to you	0	0%
	Residual	6	12%

Table 4.1 shows that about of 50% of participants used antibiotic in more than one month. The main cause of using antibiotics is sore throat (66%). The majority of them stated that the main source of antibiotics was pha

**Tables 4.2: Participants' knowledge about antibiotics (n=50):**

<b>Knowledge</b>	<b>Answer</b>	<b>Frequency</b>	<b>Percentage</b>
a. Do antibiotics kill viruses?	Yes	40	80%
	No	10	20%
	Total	50	100%
b. Are antibiotics effective against the common cold and flu?	Yes	42	84%
	No	8	16%
	Total	50	100%
c. Does imprudent use of antibiotics lead to antimicrobial resistance	Yes	30	60%
	No	20	40%
	Total	50	100%
e. Do you have enough information about antibiotics?	Yes	19	38%
	No	31	62%
	Total	50	100%

Table 4.2 shows that most of participants believe that antibiotics are effective against viruses (80%), and (84%) of them think that antibiotics effective against the common cold and flu. 60% of them believe that the imprudent use of antibiotics lead to antimicrobial resistance. (62%) of participants had poor information about antibiotics .



**Figure 4.5: Participants source of information (n=50):**

The main source of information about antibiotic is social media (24%).

**Table 4.3: Participants attitudes and adherence toward antibiotics use and self-medication with antibiotics (n=50):**

<b>Attitude and adherence</b>	<b>Answer</b>	<b>Frequency</b>	<b>Percentage</b>
a. When do you expect the doctor to prescribe antibiotics for you?	Cold/ Flu	40	80%
	After surgery	26	52%
	Other	4	8%
b. Have you ever used antibiotics without a prescription?	Yes	41	82%
	No	9	18%
	Total	50	100%
c. When using the antibiotic, do you continue to take the medicinal dose at the specified time daily?	Yes	31	62%
	No	19	38%
	Total	50	100%
d. If the answer is no, what is the reason for discontinuing to use antibiotics?	I feel better before the treatment period ends	19	38%
	Side effects of the antibiotic	4	8%
	Other	0	0%
e. Should the current use of antibiotics be restricted in order to keep them effective in the future?	Yes	35	70%
	No	9	18%
	Don't know	6	12%
	Total	50	100%

Table 4.3 shows that the majority of participants expect that doctors prescribe antibiotic for flu and cold (80%), and (52%) of them believed that doctors prescribe antibiotics after surgery. In the same time (82%) of them used antibiotics without a prescription, and (62%) of them were continued the usage medicinal dose of the antibiotic on specified time daily. The main reason was when they felt better in (38%) of them. (70%) of them were believed that the current use of antibiotics be restricted in order to keep them effective in the future .

**Table 4.4: Association of the participant’s age groups, with self-medication with antibiotic’s behavior and antibiotic resistance (n=50):**

	Age			p-value
	(18-30) years	(31-40) years	aged more than 40 years old	
Participants were used antibiotics to treat Sore throat and flu	26%	36%	38%	0.000
Pharmacy was the source of obtaining antibiotics	50%	34%	16%	0.000
Antibiotics kill viruses	38%	34%	28%	0.031
Imprudent use of antibiotics will lead to antimicrobial resistance	34%	37%	29%	0.017
Participants have used antibiotics without a prescription	36%	31%	33%	0.444
Participants was continued to take the medicinal dose at the specified time daily	39%	41%	20%	0.025
Participants when feel better were discontinue take the antibiotics	38%	62%	0%	0.000
The current use of antibiotics should be restricted in order to keep them effective in the future	33%	41%	26%	0.019
Participants source of information was social media	36%	52%	12%	0.000

Table 4.4 shows that a Chi-square test was performed to determine the associations between Participants age groups and self-medication with antibiotics behaviors, Sudanese participant’s attitude and adherence to appropriated practice toward use antibiotics. There were high statistically significant relation (p-value= 0.000) between different age groups and participants who were used antibiotics to treat Sore throat and flu and stated that pharmacy was the source of obtaining antibiotics, and they said that when feel better they were discontinue take the antibiotics. Moreover, participants source of information was social media (p-value= 0.000) .

**Table 4.5: Association of the participant’s gender, with self-medication with antibiotic’s behavior and antibiotic resistance (n=50):**

	Gender		p-value
	Male	Female	
Antibiotics kill viruses	66%	34%	0.024
Imprudent use of antibiotics will lead to antimicrobial resistance	52%	48%	0.45
Participants used antibiotics without a prescription	50%	50%	0.62
Participants was continued to take the medicinal dose at the specified time daily	41%	59%	0.16
Participants when feel better were discontinue take the antibiotics	62%	38%	0.000
The current use of antibiotics should be restricted in order to keep them effective in the future	35%	65%	0.588

Table 4.5 shows that a Chi-square test was performed to determine the associations between participant’s gender and self-medication with antibiotics behaviors, Sudanese participant’s attitude and adherence to appropriated practice toward use antibiotics. There were high statistically significant relation (p-value= 0.000) between different gender and participants when feel better were discontinue take the antibiotics (p-value= 0.000). While there was not statistic relation with participants who used antibiotics without a prescription .

**Table 4.6: Association of the educational level participants, with self-medication with antibiotic's behavior and antibiotic resistance (n=50):**

	Educational level			p-value
	secondary education level	University education level	Postgraduate education level	
Pharmacy was the source of obtaining antibiotics	31%	35%	34%	0.000
Imprudent use of antibiotics will lead to antimicrobial resistance	24%	40%	36%	0.059
Participants have used antibiotics without a prescription	26%	54%	20%	0.586
Participants was continued to take the medicinal dose at the specified time daily	10%	14%	76%	0.496
Participants when feel better were discontinue take the antibiotics	41%	25%	34%	0.19
Participants source of information was social media	32%	35%	33%	0.00

Table 4.6 shows that a Chi-square test was performed to determine the associations between Participants educational level and self-medication with antibiotics behaviors, Sudanese participant's attitude and adherence to appropriated practice toward use antibiotics. There were high statistically significant relation (p-value= 0.000) between different educational level and participants stated that pharmacy was the source of obtaining antibiotics, imprudent used of antibiotics will lead to antimicrobial resistance and participants source of information was social media (p-value= 0.000) .



**Table 4.7: Association of the patient’s employments status, with self-medication with antibiotic’s behavior and antibiotic resistance (n=50):**

	Employments			p-value
	Employed	Unemployed	Retired	
Pharmacy was the source of obtaining antibiotics	42%	26%	32%	0.00
Imprudent use of antibiotics will lead to antimicrobial resistance	30%	46%	24%	0.745
Participants have used antibiotics without a prescription	22%	23%	55%	0.027
Participants was continued to take the medicinal dose at the specified time daily	63%	18%	19%	0.345
Participants when feel better were discontinue take the antibiotics	32%	34%	34%	0.000
Participants source of information was social media	68%	32%	0%	0.000

Table 4.7 shows that a Chi-square test was performed to determine the associations between Participants employments status and self-medication with antibiotics behaviors, Sudanese participant’s attitude and adherence to appropriated practice toward use antibiotics. There were high statistically significant relation (p-value= 0.000) between different employments status and participants stated that pharmacy was the source of obtaining antibiotics, participants when feel better were discontinue take the antibiotics and their source of information was social media (p-value= 0.000) .

### **The Results of Focus Group Discussion in Points:**

- Antibiotics are extensively used without prescription without asking for symptoms
- Most pharmacists distribute antibiotics with prescription because believe that most of their patients had no affordability and accessibility to health services
- In some cases they distribute antibiotics according to symptoms.
- Most of pharmacies are owned to business men who pressure the pharmacists to distribute drugs in different if they have prescription
- Laws and Acts exists but not applied as there is no proper supervision from the Ministry of Health

## Chapter five

### Discussion

In this cross-sectional descriptive study, among (n=50) participants, the study results indicated that fifty percent [n=25; (50%)] of participants have stated that the previous time of self-medication with antibiotics used was in more than a month.

This result is similar to previous cross-sectional studies performed in Kuwait and China, where (72.8%) and (45.7%) of respondents, respectively stated they had used antimicrobials in the last 6 to 12 months, and (64.0%) of Chinese respondents had self-medicated (1) (6). Also, (81.8%) of the Sudanese respondents have used medicines without a medical consultation within 2 months (2) and (79.5%) of Sudanese university students were stated that they were used antibiotics without a prescription within 1–2 months (20) and responded that the main source of drugs was community pharmacy (2). The justification of the highest usage of antibiotic's percentage; returns to self-treatment behavior.

In the current study, the main reasons of used antibiotics were sore throat in sixty-six percent [n=33; (66%)] of participants, while sixty-four percent [n=32; (64%)] of participants used antibiotics to treat flu.

There is a high association between participant's age and the reason of used antibiotics, where 36% of participants aged (31-40) years and 38% of participants aged more than 40 years old used antibiotics to treat sore throat and flu symptoms (p-value=0.000). The main reason behind this was respondents' previous experiences with similar symptoms.

In the same direction, this result is compatible with studies conducted in Nepal, Kuwait, China, and Poland. The quantitative survey was conducted in Nepal was reported that (84.6%) of Nepal participants were preferred to use antibiotics when they have a cough and sore throat (16). A cross-sectional survey was conducted in Kuwait was stated that(27.5%) of participants were self-medicated with antibiotics to treat the mainly common cold, sore throat, and cough (1).

A cross-sectional survey was conducted in China was stated that cough, sore throat, and bronchitis were the most frequent reasons reported for antibiotic use (6). While the cross-sectional study was carried out Poland was reported the lowest proportion of mention taken antibiotics during the year in 40% of respondents to treat their common cold, sore throat, flu,

and cough. The younger respondents between the age of 18–24 years old believed that antibiotics are effective against the flu respondents > 60 OR = 0.19, 95% CI = 0.13–0.28) (17).

In the current study, the majority of participants said that they get antibiotics from a community pharmacy in [n=48; (96%)] of respondents. Moreover, other responders declared that antibiotics were residual of previous prescription [n= 6; (12%)]. 50% of participants aged (18-30) years old (p-value=0.000) and 35% of university student participants (p-value=0.000) were obtained antibiotics from pharmacy.

This result is similar to a study conducted in China, which reported that the main source of self-medicated antibiotics was pharmacy [n=442; (80.2%)] and other sources included leftover medication from a previous prescription [n=97; (17.8%)] (6). Moreover, In Sudan, a descriptive cross-sectional study was performed with aim of estimated the prevalence of self-medication with antibiotics among Sudanese university student who responded that the main source of drugs was community pharmacies (20).

In contrast, the Poland study reported opposite findings when asked the participants about how they obtained the antibiotics course, polish participants reported that almost all of them (90%) said that they had obtained their last course of antibiotics from a physician's prescription and only 3% of respondents stated that they had acquired an antibiotic from a pharmacy without a prescription (17).

Regarding participant's knowledge, this study highlights participant's poor knowledge of antibiotics. Eighty percent [n=40; (80%)] of participants were believed that antibiotics kill viruses, while eighty-four percent [n=42; (84%)] of participants thought that antibiotics are effective against the common cold and flu.

The percentage of participants who believed that antibiotics kill viruses decreased with age increase (p-value=0.031), and highly associated with (p-value=0.024) Where 38% participants within age group (18 to 30) years old, 66%. Male participants were stated that antibiotics had activity against viruses.

In comparison to other study were collected from Kuwaiti polish and Chinese participants on knowledge about antibiotics, (36.2%), (60%) and (54.8%) of respondents, respectively believed that antibiotics kill viruses (1) (17) (6).

Interestingly, the cross-sectional Poland study reported a consistent finding to the current study. Where males (66%) more often than females (56%), declared that antibiotics were active against viruses (OR = 1.64, 95% CI = 1.44–1.86). The same opinion was also expressed by the younger respondents (17). (54.3%) of Kuwaiti respondents were said that if they get side effects during a course of antibiotics treatment they stop taking them. (1). Polish participants believed that antibiotics are effective against flu (49%) and colds (36%) and (14.4%) Chinese participants were said that antibiotics can be used immediately to treat the common cold (17) (6).

Sixty percent [n=30; (60%)] of respondents were known that imprudent use of antibiotics leads to antimicrobial resistance. % 52 of male participants were more aware that imprudent use of antibiotics leads to antimicrobial resistance than females 48% (p-value=0.45).

This result was lower than the result reported by (17), eighty percent (86%) of Polish respondents have truly answered a question about imprudent use of antibiotics leads to antimicrobial resistance.

Interestingly, in this study participants within age group (18-30) years old and (31-40) years old were answered the question about that imprudent uses of antibiotics lead to antimicrobial resistance correctly 34% and 37%, respectively (p-value=0.017). Additionally, participants with higher educational levels were more associated with antimicrobial resistance (p-value=0.059). Where participants with university 40% and postgraduate 36% education level were stated that imprudent use of antibiotics leads to antimicrobial resistance.

This result is comparable with the findings obtained from the previous study conducted in Vietnam, was reported that higher age and education were positively associated with being aware of antibiotic resistance. Females had a lower likelihood of being aware of antibiotic resistance's (OR=0.64; 95%CI=0.45-0.90) compared to male counterparts (18).

Eighty percent [n=40; (80%)] of participants were expected the doctor to prescribe antibiotics for them to treat cold and flu,

This result was higher than the result reported by (17), approximately 41% of the respondents expected a prescription for an antibiotic against flu.

In this study, eighty-two percent [n=41; (82%)] of participants had used antibiotics without a prescription. This result was higher than the result reported by (1), where 217 (31.9%) of

Kuwaiti respondents' were preferred to buy antibiotics from the pharmacy without a prescription.

Additionally, in current study the self-treatment with antibiotics behavior without a prescription were associated with age groups (p-value=0.444), educational level (p-value=0.586) and employments (p-value=0.027), while it was not associated with gender (p-value=0.62). Particularly regarding employment status, 55% and 23% of retired and unemployed, respectively were used antibiotics without a prescription (p-value=0.027). Moreover, 36% of participants in the age group (18-30) year old group were stated that they had used antibiotics without a prescription.

These results were comparable with Chinese study performed by Yuefeng, Keqin, and Xiaowei, 2012 (14) with aimed of analyzed the trends of and factors related to self-treatment. The self-treatment behavior differs according to age. There were a significantly larger proportion of respondents opting for self-treatment in the higher age and education categories. Workers were more likely to self-treat than unemployed. Moreover, a descriptive cross-sectional study was performed with aim of estimated the prevalence of self-medication with antibiotics among 5 universities students in Khartoum State, Sudan (20). Self-medication with antibiotics was significantly more common among students 21 years of age or older compared with those 20 years of age or younger (p-value = 0.004).

Sixty-two percent [n= 31; (62%)] of participants believed that they should continue to take the medicinal dose at the specified time daily to avoid antibiotics resistance, 59% of females were continued to take the medicinal dose at the specified time daily (p-value=0.16). While thirty-eight percent [n=19; (38%)] of participants were discontinuing to use antibiotics because they feel better before the treatment period ends. 62% of males were discontinued take the antibiotics when felt better than females (p-value=0.000)

These findings are in agreement with Kuwaiti, polish and Chinese studies which reported that the majority of the respondents(36%), (79%) and (28.8%) of respondents had taken the full dose of the antibiotic prescribed (1) (17) (6). 41% of young polish responders were aged 18–24 stated that they were taken a full dose of the antibiotic prescribed (OR = 0.28, 95% CI = 0.17–0.45). The most common reason for stopping antibiotic treatment early was the resolution of symptoms and felt better in (47%) of polish participants and more males (54%) than females (39%) claimed to have stopped taking antibiotics due to a relief in symptoms (OR = 1.94, 95%CI = 1.27–2.97) (17) and (17.2%) of Kuwaiti participants. Moreover, Awad

and Eltayeb (20) were stated that the most common reason indicated for self-medication among Sudanese university student respondents' were their previous experiences with similar symptoms.

Additionally in this cross-sectional study, the participants were asked if should the current use of antibiotics be restricted in order to keep them effective in the future, seventy percent [n=35; (70%)] of participants thought that true.

In contrast, (82%) of polish responders were also agree when they asked the same question about the limitation of antibiotics to be used effectively in the future (17).

Sixty-two percent (62%) of participants were stated that they had known poor information about antibiotic resistance. This result was similar to cross-sectional was performed in Malawi (12). Where respondents had little knowledge of antimicrobials, their use, or any awareness of antimicrobial resistance. Additionally, a cross-sectional survey was performed Jordan (15) had comparable finding were 55.6% of participants were used antibiotics as prophylaxis against infections and 67% percent of Saudi participants were unaware of the meaning of ABs resistance (21).

The unexpected result of this cross-sectional study was twenty-four percent [n= 12; (24%)] of participants were getting their information about antibiotics and self-medication from social media, while twelve percent [n= 6; (12%)] of participants were getting their information from doctor, pharmacist and their friend. 52% of participants were aged (31-40) years had used social media as a source of their information (p-value=0.000).

This answer percentage distribution is not compatible with a polish survey, were reported that the most commonly indicated sources of participant's knowledge were websites dedicated to health (57%), information from physicians (32%), and family and friends (19%). Also contradicting, polish respondents older than 60 less frequently than in other age groups searched information on the Internet (OR = 0.16, 95% CI = 0.08–0.32) (17).

### **The study limitations:**

- Some questions were difficult for the participants to understand and needed to assess and explain to them.
- Small sized population was selected to be more accurate.
- Convenience study selected randomly to be easy for researcher herself and clear.



## Chapter Six

### Conclusion & Recommendations

#### 6.1 Conclusion

- Half of the respondents [n=25; (50%)] have stated that the previous time of self-medication with antibiotics used was in more than a month.
- There is a high association between participant's age and the reason of used antibiotics, where 36% of participants aged (31-40) years and 38% of participants aged more than 40 years old used antibiotics to treat sore throat and flu symptoms (p-value=0.000). 50% of participants aged (18-30) years old (p-value=0.000) and 35% of university student participants (p-value=0.000) obtained antibiotics from pharmacy.
- Regarding participant's knowledge, (62%) of participants stated that they had known poor information about antibiotic resistance. [n=40; (80%)] of them believed that antibiotics kill viruses. 38% participants within age group (18 to 30) years old (p-value=0.031), 66% of male participants stated that antibiotics had activity against viruses (p-value= 0.024).
- Sixty percent [n=30; (60%)] of respondents knew that imprudent use of antibiotics leads to antimicrobial resistance. 52% of males' participants (p-value=0.45), and 37%, within (31-40) years old (p-value=0.017) and participants with university 40% (p-value=0.059) were more aware of that imprudent used of antibiotics lead to antimicrobial resistance.
- More than half of participants 52% of the age group (31-40) years had used social media as a source of their information about self-medication with antibiotics and antibiotics resistance (p-value=0.000).
- According to the attitude and adherence of Sudanese participants toward self-treatment with antibiotics, participants who used antibiotics without a prescription were associated with age group (p-value=0.444) and unemployment status (p-value=0.027), while were not associated with gender (p-value=0.62).
- Sixty-two percent [n= 31; (62%)] of participants believed that they should continue to take the medicinal dose at the specified time daily to avoid antibiotics resistance, 62% of

males were discontinued take the antibiotics when feeling better than females (p-value=0.000).

## **6.2 Recommendations**

1- The study highly recommends that Ministry of Health should conduct educational campaigns for public Sudanese because it's important in different aspects.

Firstly, to designing future multifaceted interventions to promote specific messages to rationalize antibiotic use,

Secondly, to compensate for knowledge and attitude gaps as an effort towards preventing the development of antibiotic resistance

2- Also the study highly recommends future studies to Study the influence of the various jobs of participants on self-medication behavior prevalence.

3- The study recommends conducting other self-medication behavior prevalence researches in a different area and their objectives include assess health providers on antibiotic resistance.

## **6.3 Focus Group recommendations:**

1- In-service training for pharmacists on Primary Health Care and Symptomatic diagnosis

2- Acts and laws should be reviewed according to the cultures and socio-economic factors

3- Checking the licenses of pharmacy; pharmacists should be a part of owning pharmacies

4- More health awareness of the community on rational use of antibiotics

5- Further studies on rational use of drugs

## References

1. Awad AI, Aboud EA. Knowledge, attitude and practice towards antibiotic use among the public in Kuwait. *PLoS One*. 2015;10(2):1–15.
2. Awad AI, Eltayeb IB, Capps PA. Self-medication practices in Khartoum State, Sudan. *Eur J Clin Pharmacol*. 2006;62(4):317–24.
3. Laxminarayan R, Duse A, Wattal C, Zaidi AKM, Wertheim HFL, Sumpradit N, et al. Antibiotic resistance-the need for global solutions. *Lancet Infect Dis*. 2013;13(12):1057–98.
4. Bell BG, Schellevis F, Stobberingh E, Goossens H, Pringle M. A systematic review and meta-analysis of the effects of antibiotic consumption on antibiotic resistance. *BMC Infect Dis*. 2014;14(1):1–25.
5. Eltayeb N, Abdulgader A, Khidir R, Galil A, Yahaya S, Nour M, et al. Irrational use of antibiotics with representation of antimicrobial resistance patterns in Sudan: a narrative review. 2021;5(1).
6. Ye D, Chang J, Yang C, Yan K, Ji W, Aziz MM, et al. How does the general public view antibiotic use in China? Result from a cross-sectional survey. *Int J Clin Pharm*. 2017;39(4):927–34.
7. You JHS, Yau B, Choi KC, Chau CTS, Huang QR, Lee SS. Public knowledge, attitudes and behavior on antibiotic use: A telephone survey in Hong Kong. *Infection*. 2008;36(2):153–7.
8. Hulscher MEJL, van der Meer JWM, Grol RPTM. Antibiotic use: How to improve it? *Int J Med Microbiol* [Internet]. 2010;300(6):351–6. Available from: <http://dx.doi.org/10.1016/j.ijmm.2010.04.003>
9. Costelloe C, Metcalfe C, Lovering A, Mant D, Hay AD. Effect of antibiotic prescribing in primary care on antimicrobial resistance in individual patients: Systematic review and meta-analysis. *BMJ*. 2010;340(7756):1120.
10. Rather IA, Kim BC, Bajpai VK, Park YH. Self-medication and antibiotic resistance: Crisis, current challenges, and prevention. *Saudi J Biol Sci* [Internet]. 2017;24(4):808–12. Available from: <http://dx.doi.org/10.1016/j.sjbs.2017.01.004>

11. Sa'adatu Sunusi L, Mohamed Awad M, Makinga Hassan N, Abubakar Isa C. Assessment of Knowledge and Attitude toward Antibiotic Use and Resistance among Students of International University of Africa, Medical complex, Sudan. *Glob Drugs Ther.* 2019;4(2).
12. Sambakunsi CS, Småbrekke L, Varga CA, Solomon V, Mponda JS. Knowledge, attitudes and practices related to self-medication with antimicrobials in Lilongwe, Malawi. *Malawi Med J.* 2019;31(4):225–32.
13. & Siliquini RGMGRSGBF. General population's knowledge and attitudes about antibiotics: a systematic review and meta-analysis. *Pharmacoepidemiol Drug Saf.* 2015;24(1):2–10.
14. Yuefeng L, Keqin R, Xiaowei R. Use of and factors associated with self-treatment in China. *BMC Public Health.* 2012;12(1).
15. Shehadeh M, Suaifan G, Darwish RM, Wazaify M, Zaru L, Alja'fari S. Knowledge, attitudes and behavior regarding antibiotics use and misuse among adults in the community of Jordan. A pilot study. *Saudi Pharm J.* 2012;20(2):125–33.
16. Nepal A, Hendrie D, Robinson S, Selvey LA. Knowledge, attitudes and practices relating to antibiotic use among community members of the Rupandehi District in Nepal. *BMC Public Health.* 2019;19(1):1–12.
17. Mazińska B, Struzycka I, Hryniewicz W. Surveys of public knowledge and attitudes with regard to antibiotics in Poland: Did the European Antibiotic Awareness Day campaigns change attitudes? *PLoS One.* 2017;12(2):1–18.
18. Ha T Van, Nguyen AMT, Nguyen HST. Public Awareness about Antibiotic Use and Resistance among Residents in Highland Areas of Vietnam. *Biomed Res Int.* 2019;2019.
19. Pan H, Cui B, Zhang D, Farrar J, Law F, Ba-Thein W. Prior knowledge, older age, and higher allowance are risk factors for self-medication with antibiotics among University students in Southern China. *PLoS One.* 2012;7(7).
20. Awad AI, Eltayeb IB. Self-medication practices with antibiotics and antimalarials among Sudanese undergraduate university students. *Ann Pharmacother.* 2007;41(7–

8):1249–55.

21. Al-Shibani N, Hamed A, Labban N, Al-Kattan R, Al-Otaibi H, Alfadda S. Knowledge, attitude and practice of antibiotic use and misuse among adults in Riyadh, Saudi Arabia. *Saudi Med J.* 2017;38(10):1038–44.

## **Annexes**

**Annex 1: English questionnaire**

**Annex 2: Arabic Questionnaire**

**Annex 1: English questionnaire :**

**International University of Africa**

**Post graduate Studies and Scientific**

**Research and Publications**

**Master Program of Public Health**

**Assessment of the Self-medication with antibiotics behaviors At Khartoum  
locality , Sudan 2021**

Participant number:	Date of study:
Study site:	

**❖ Section one: Socio—demographic characteristics of Patients:**

1. Age:

- 18-30  
 31-40  
 More than 41 years old

2. Gender

- Male       Female

3. Participants education level:

- Illiterate  
 Primary  
 Secondary  
 University  
 Postgraduate



4. Participants employment status?

- Employed
- Unemployed
- Retired

❖ **Section two: measure medication adherence and attitude toward practice of self-medication with antibiotics:**

**1. Use of antibiotics, including previous antibiotic exposure:**

a. When was the last time you used antibiotics?

- Week
- Month
- More than that

b. I need to use antibiotics at .....? (You can choose more than one answer)

- Sore throat
- flu
- Others (if your answer was in the last, what? .....)

.....

c. Ways of obtaining antibiotics? (You can choose more than one answer)

- Pharmacy
- Someone give it to you
- Remaining treatment from my last period of illness

(Residual)

**2. Participants knowledge about antibiotics:**

a. Do antibiotics kill viruses?

- Yes
- No

b. Are antibiotics effective against the common cold and flu?

- Yes
- No

c. Does imprudent use of antibiotics lead to antimicrobial resistance?

Yes

No

**3. Participants attitudes and behaviors toward antibiotics use:**

a. When do you expect the doctor to prescribe antibiotics for you? (You can choose more than one answer)

Cold/ Flu

After surgery

Other (If your answer was another, what?) .....

b. Have you ever used antibiotics without a prescription?

Yes

No

c. When using the antibiotic, do you continue to take the medicinal dose at the specified time daily?

Yes

No

d. If the answer is no, what is the reason for discontinuing to use antibiotics? (You can choose more than one answer)

I feel better before the treatment period ends

Side effects of the antibiotic

Other (if your answer is other, what? .....

e. Should the current use of antibiotics be restricted in order to keep them effective in the future?

Yes

No

Don't know

**4. Participants sources of information**

a. Do you think that you know enough information about the antibiotic resistance?

Yes

No

b. what is your the source of information?

- Study
- Doctor, pharmacists
- Friend
- Social media

## Annex 2: Arabic questionnaire:

جامعة إفريقيا الدولية

الدراسات العليا والعلمية

برنامج ماجستير الصحة العامة

تقييم العلاج الذاتي و سلوكيات المضادات الحيوية بمحلية الخرطوم السودان. 2021.

القسم الأول: الخصائص الاجتماعية والديموغرافية للمرضى:

1 العمر:

18-24

25-34

35-44

45-59

فوق 60

2 الجنس

ذكر  انثى

3 المستوى التعليمي:

أمي

ابتدائي

ثانوي

جامعة

دراسات عليا

#### 4 الوظيفة

اعمل

عاطل عن العمل

متقاعد

القسم الثاني: قياس مدى الالتزام بالأدوية والموقف تجاه ممارسة العلاج الذاتي بالمضادات الحيوية:

1 استخدام المضادات الحيوية ، بما في ذلك التعرض السابق للمضادات الحيوية :

أ. متى كانت اخر مره استخدامت فيها المضادات الحيوية ؟

اسبوع  شهر  اكثر من ذلك

ب. احتاج ان استعمل المضادات الحيوية عند ..... ؟ ( يمكن اختيار اكثر من اجابه)

التهاب الحلق

انفلونزا

أخرى (اذا كانت اجابتك باخر ماهي؟ .....

ج. طرق الحصول على المضادات الحيوية؟ ( يمكن اختيار اكثر من اجابه)

صيدلية

شخص تعرفه اعطاك

متبقى علاج من فتره مرضي الاخيره

2 المعرفة بالمضادات الحيوية:

أ. هل المضادات الحيوية تقتل الفيروسات؟

نعم  لا

ب. هل المضادات الحيوية فعالة ضد نزلات البرد والانفلونزا؟

نعم  لا

ج. هل يؤدي الاستخدام غير الحكيم للمضادات الحيوية إلى مقاومة الجسم للعلاج؟

نعم  لا  اعلم

### 3 المواقف والسلوكيات تجاه المضادات الحيوية

أ. متى تتوقع ان يصف لك الطبيب المضادات الحيوية؟ ( يمكن اختيار اكثر من اجابه)

نزلات البرد / الانفلونزا

بعد الجراحة

أخرى (اذا كانت اجابتك اخرى ماهي؟) .....

ب. هل سبق و استخدم المضادات الحيوية بدون وصفة طبية

نعم  لا

ج. عند استعمالك للمضاد الحيوي هل تستمر في تأخذ جرعه العلاجيه في الوقت المحدد يوميا؟

نعم  لا

د. اذا كانت اجابتك ب لا, ماهو سبب عدم الاستمرار في استعمال المضادات الحيوية؟ ( يمكن اختيار اكثر من اجابه)

أشعر بالراحة او بتحسن قبل انتهاء فتره العلاج

الاعراض الجانبيه للمضاد الحيوي

أخرى (اذا كانت اجابتك باخر ماهي؟) .....

ه. هل ينبغي تقييد بالاستخدام المضادات الحيوية حتى الانتهاء من فتره العلاج من أجل إبقائها فعالة في المستقبل؟

نعم  لا  اعلم

#### 4 مصادر المعلومات

أ. هل تعتقد أنك تعرف معلومات كافية عن مقاومة المضادات الحيوية؟

نعم  لا

ب. إذا كانت إجابتك نعم , ما هو مصدر معلوماتك؟ ( يمكن اختيار أكثر من إجابة)

دراسة

دكتور ، صيادلة

صديق

وسائل التواصل الاجتماعي