



International University of Africa



**Deanship of Postgraduate Studies and Scientific Research and
Publication**

FACULTY OF MEDICINE

**Knowledge , Attitude and Practice of Dental Health Personnel about
dental medical waste at primary health care level – Khartoum state –
Sudan**

2019-2020

Submitted by:

Fatima Mohamed Ahmed Elsharif

Bachelor of Dentistry

The thesis is submitted in partial fulfillment of the requirement for the
MSc (public health) .

Supervised by :-

Dr. Abdelmageed Osman Musa

MBBS -MD Community Medicine

November 2019

Dedication

To my parents who did anything and everything for us to prepare us to
face the future .

To my brothers and sisters who supported me during my years of study .

Acknowledgement

Firstly, we thank THE ALMIGHTY GOD for giving us the opportunities to complete my research.

And I would like to express my sincere thanks and gratitude to my supervisor Dr. Abdelmageed Osman Musa for his supervision , suggestion , endless support guidance , advice and assistance during the course of this study .

Finally thanks to my colleagues all doctors and dental assistant in health center who accepted to participate in this study .

English Abstract :-

The study was a descriptive cross-sectional institutional based .

Study Population: General Dentists (17) and dental assistants (9) consultant (1) . A total number of 27 health personnel

The general objective was to study the knowledge , attitude and practice of the health personnel on the management of dental medical waste .

Medical waste is a total waste which is generated from the healthcare facilities (HCFs) during the course of the healthcare delivery process(2) It includes syringes, needles, ampoules, dressings, disposable plastics and microbiological wastes (3). The waste generated from the HCFs is broadly categorized as general or hazardous waste.

Poor management of health care waste potentially exposes health care personnel, waste handlers, patients and the community at large to infection, toxic effects and injuries, and risks polluting the environment. It is essential that all medical waste materials are segregated at the point of generation, appropriately treated and disposed off safely.

Data collection tools and techniques: Interviewing using a questionnaire: A predesigned and pretested Questionnaire was filled through direct interview with all study population . The main age group is between 30-45years

The results of the study showed The study showed shortage of technical staff (dental medical officers ,consultants and dental medical assistants) in all health centers as reflected by one dentists in most of health centers and one dental assistants (59%)some health centers have one dentist only without an assistant .Twenty six (96.3%) participants acknowledged that waste is collected daily, Majority of participants 25 (92.6%) are using protective tools and clothing on a regular basis, and medical waste sorted from ordinary waste. Only 15 (55.6%) participants follows the coloring code for the disposal containers. The Analysis of the results reveled the following :-

Medical waste handling is a hazardous activity and it needs the use of proper PPE; Using protective tools and clothing on a regular basis (PPE) showed a statically significant score with a P Value of (0.01) . the results reflects a majority of participants- eighteen - (72.0 %) (with a good knowledge . and reflects the high awareness of the staff on the hazardous nature of the medical waste and the importance of using PPE to protect themselves . Table (14) .

The association between the collection of medical waste on a daily basis and Practice :- The relationship between whether the medical waste is collected on daily basis or not showed a good association which is statistically significant . P. Value = (0.01) -Table (15)

الخلاصة العربية

كانت الدراسة وصية مستعرضة على أساس مؤسسي.

مجتمع الدراسة: أطباء الأسنان العامون (١٧) ومساعدو الأسنان (٩) استشاري (١). ما مجموعه ٢٧ من العاملين الصحيين مباشرة مع جميع أفراد مجتمع الدراسة. الفئة العمرية الرئيسية هي بين ٣٠-٤٥ سنة كان الهدف العام هو دراسة معرفة وموقف وممارسة العاملين الصحيين في إدارة مخلفات طب الأسنان.

النفائات الطبية هي نفائات كلية يتم توليدها من مرافق الرعاية الصحية خلال عملية تقديم الرعاية الصحية وتشمل المحاقن والإبر والأمبولات والضمادات والبلاستيك القابل للتصرف والنفائات الميكروبيولوجية . يتم تصنيف النفائات الناتجة عن مركبات الكربون الهيدروكلورية فلورية على نطاق واسع على أنها نفائات عامة أو خطيرة.

تؤدي الإدارة الرديئة لنفائات الرعاية الصحية إلى تعريض العاملين في مجال الرعاية الصحية ومعالجي النفائات والمرضى والمجتمع ككل للعدوى والآثار والإصابات السامة ومخاطر تلويث البيئة. من الضروري أن يتم عزل جميع مواد النفائات الطبية عند نقطة التوليد ، ومعالجتها والتخلص منها بطريقة آمنة.

أدوات وتقنيات جمع البيانات: إجراء المقابلات باستخدام استبيان: تم ملء استبيان محدد مسبقًا ومختبر من خلال مقابلة أظهرت نتائج الدراسة أن الدراسة تظهر نقصًا في الكوادر الفنية اطباء طب الأسنان ، مستشارون ومساعدو طب أسنان) في جميع المراكز الصحية كما يتضح من طبيب أسنان واحد في معظم المراكز الصحية ومساعدو طبيب أسنان (٥٩٪) لدى بعض المراكز الصحية طبيب أسنان واحد فقط بدون مساعد. أقر ستة وعشرون (٩٦.٣٪) من المشاركين بأن النفائات يتم جمعها يوميًا ، وتستخدم غالبية المشاركين ٢٥ (٩٢.٦٪) أدوات وملابس واقية على أساس منتظم ، والنفائات الطبية مرتبة من النفائات العادية. فقط ١٥ (٥٥.٦٪) من المشاركين يتبعون رمز التلوين لحاويات التخلص منها. كشف تحليل النتائج ما يلي: -

تعتبر معالجة النفائات الطبية نشاطًا خطيرًا وتحتاج إلى استخدام معدات الوقاية الشخصية المناسبة ؛ أظهر استخدام أدوات وقائية واقية على أساس منتظم (PPE) درجة ذات دلالة إحصائية بقيمة $P (0.01)$. تعكس النتائج غالبية المشاركين - ثمانية عشر - (٧٢.٠٪) (بدرجة جيدة. وتعكس وعي الموظفين الكبير بالطبيعة الخطرة للنفائات الطبية وأهمية استخدام معدات الوقاية الشخصية لحماية أنفسهم. جدول (١٤) .

العلاقة بين جمع النفائات الطبية على أساس يومي والممارسة: - العلاقة بين ما إذا كانت النفائات الطبية يتم جمعها على أساس يومي أو لا تعطي درجة جيدة والتي هي ذات دلالة إحصائية. $P = (٠.٠١)$ - الجدول (١٥)

List of contents

| Content | Page |
|-------------------|-------|
| Dedication | .I |
| Acknowledgement | .II |
| List of contents | .III |
| List of figures | .IV |
| List of tables | .V |
| Abbreviations | .VI |
| English abstract | .VII |
| Arabic abstract | .VIII |
| Chapter one | 1 |
| Introduction | 1 |
| Literature review | 6 |
| Objective | 10 |
| Chapter two | 6 |
| Methodology | 11 |
| Chapter three | 13 |
| Results | 13 |
| Chapter four | 34 |
| Check List | 34 |
| Discussion | 35 |
| Conclusion | 37 |
| Recommendations | 38 |
| References | 39 |

List of Figures

| Figure Number | Figure Title | Page |
|----------------------|--|-------------|
| Figure (1) | : Distribution of the study population according to centers | 13 |
| Figure(2) | Distribution of the study population according to age | 14 |
| Figure(3) | Distribution of study population according to scientific degree | 15 |
| Figure(4) | Distribution of total study sample according to experience (years) | 16 |
| Figure(5) | The status of vaccination of the centers workers | 17 |
| Figure(6) | Workers confirming presence of policies for vaccination | 18 |
| Figure(7) | schedule of vaccination | 19 |
| Figure(8) | guidelines of waste management | 20 |

List of Table

| Table Number | Table Title | Page |
|--------------|---|------|
| Table (1) | Health Centers included in the study and the distribution of study population in each | 21 |
| Table (2) | Experience of different health personnel | 22 |
| Table (3) | The status of vaccination of the center's workers | 23 |
| Table (4) | Presence of infection control committees and their effectiveness at the center | 24 |
| Table(5) | Results of questionnaires on KAP | 25 |
| Table (6) | Type of training among health -care workers | 26 |
| Table (7) | Level of practice of dental waste management at the level of health centers | 26 |
| Table ((8) | Vaccination schedule | 27 |
| Table (9) | Summary of attitude of Dental Health Personnel regarding dental medical waste management at the Level of Health Centers – Khartoum locality | 26 |
| Table (10) | Summary of attitude regarding presence of written guide lines and infection control committees at the Level of Health Centers – Khartoum locality | 27 |
| Table (11) | Association between age groups and knowledge of health personnel in dental medical waste management | 27 |
| Table (12) | Relationship between scientific degree of health personnel and their knowledge regarding dental medical waste management . | 28 |
| Table (13) | Relationship between the experience of health personnel and their knowledge regarding dental medical waste management , in health centers , Khartoum locality | 29 |

| | | |
|------------|---|----|
| | | |
| Table (14) | The association between the handling of medical waste done in the way that they were taught and knowledge | 30 |
| Table (15) | The association between the training after graduation to deal with medical waste and knowledge | 31 |
| Table (16) | The association between using a protective tools (PPE) and clothing on a regular basis and knowledge of the staff . | 32 |
| Table(17) | The association between the collection of medical waste on a daily basis and Practice | 33 |

Table of Abbreviation and acronyms

| | |
|-------|--|
| KAP | Knowledge , attitude and practices |
| BMW | Biomedical waste |
| MWM | Medical waste management |
| WHMIS | Work place hazardous material information system |
| HCFs | Health care facilities |
| PPE | Personal protective equipment |
| MPHW | Multipurpose health worker |
| WHO | World health organization |
| HIV | Human immunodeficiency virus |
| HBV | Hepatitis B Virus |
| HCV | Hepatitis C virus |
| MWHs | Medical waste handlers |
| CWC | Certified biomedical waste carrier |

Chapter One

Introduction

1.1 Introduction:

Medical waste is material that is potentially infectious. The source of waste can be dental clinics, physician office, medical laboratories, medical research facilities, as a result of treatment or immunization, surgical and diagnostic procedures.

Medical wastes are of great importance due to its potential environmental hazards and public health risks.

World Health Organization (WHO) has advocated medical waste as special waste and it is now commonly acknowledged that certain categories of medical waste are among the most hazardous and potentially dangerous of all wastes arising in communities, as exposure to hazardous medical waste can result in disease or injury. The hazardous nature of medical waste may be due to one or more of the following characteristics: it contains infectious agents, toxic or hazardous chemicals or pharmaceuticals, sharps, genotoxic and radioactive. Infectious medical waste, particularly sharp ones, have been responsible for most of the accidents reported in literature. WHO estimated that, in 2000, injections with contaminated syringes caused 21 million hepatitis B, 2 million hepatitis C and 260,000 HIV infections. (1)

1.2. Problem statement:-

Knowledge, practice, attitude and training of health workers in dental clinics are important measures for prevention and control of waste hazards to human health , to the environment and to increase in the prevalence of post extraction infection and to increase prevalence of hepatitis B infection .

(WHO estimated that, in 2000, injections with contaminated syringes caused 21 million hepatitis B, 2 million hepatitis C and 260,000 HIV infections) .

1.3 Justification :-

Waste management is the collection transport processing, recycling or disposal of waste material. The waste produced in the course of healthcare activities carries a higher potential for infection and injury than any other type of waste.

Inadequate and inappropriate knowledge of handling of healthcare waste may have serious health consequences and a significant impact on the environment as well . According to the WHO estimation, the general and hazardous waste types constituted about 85% and 15%, respectively (12).

Dental practice generates large amounts of waste most of which may be contaminated with body fluid which could be hazardous to human health.

Poor waste management poses a huge risk to the health of the public, patients and professionals and contribute to environmental degradation.

Data which would be collected is expected to help in improving the policies and strategies of waste management at the level of health centers.

1.4 Hypothesis or Research question ?

1.4.1 Is the knowledge of health personnel adequate ?

Is the practice of health personnel adequate ?

Is the attitude of health personnel adequate ?

1.5 Objective :-

General objective:

To study knowledge, attitude, and practices of doctors and dental assistants regarding biomedical waste management in dental clinics in primary health care centers in Khartoum locality .

Specific Objectives :-

1-To assess the Knowledge, attitudes and practice of dental staff about dental waste management including the various types of waste, their generation, collection, transportation, and final disposal.

2- To identify different factors affecting knowledge , attitude and practice .

Chapter Two

Literature Review

Medical waste is a total waste which is generated from the healthcare facilities (HCFs) during the course of the healthcare delivery process(2) It includes syringes, needles, ampoules, dressings, disposable plastics and microbiological wastes (3). The waste generated from the HCFs is broadly categorized as general or hazardous waste.

Medical waste can also be defined as hazardous waste which contains organic or inorganic elements or compounds that may owing to their inherent physical, chemical or toxicological characteristic and have a detrimental impact on health and the environment.

Dental waste can be hazardous to human and the environment. Proper handling, treatment and disposal of biomedical waste are important elements of health care.

Studies have shown that waste water from dental offices typically contains elevated concentrations of metals such as mercury, silver, copper, tin and zinc. Sources of these metals include placement and removal of amalgam fillings (mercury, silver, copper, tin) .

Dental Medical wastes (DMW) can be hazardous or nonhazardous wastes

It is estimated that 10-25% of health care waste is hazardous, with the potential for creating a variety of health problems. The waste produced in the course of healthcare activities carries a higher potential for infection than any other type of wastes (4) .

Hazardous waste include :-

Mercury-containing wastes:-

Dental Amalgam particles are a source of mercury which is known to be a neurotoxic, nephrotoxic, and bio accumulative element. It can get into the environment through waste water, scrap amalgam or vapors.

Silver-containing wastes:-

(A) Spent X-ray fixer used in dental clinics to develop X-rays is a hazardous material that should not be simply rinsed down the drain. After desilvering the fixer with a recovery unit, it can be mixed with developer and water and disposed down the sewer or septic system. Spent developer is permitted to be discharged in the above systems after dilution with water. The silver should be handed over to the certified biomedical waste carrier (CWC). Using a digital X-ray unit and an X-ray cleaner without chromium are other suggested safety measures.

(B) Undeveloped X-ray films contain a high level of silver and must be treated as hazardous waste. It is advisable to collect any unused film that needs disposing in a recommended container for recycling by the disposal company. Using a digital X-ray unit minimizes purchase of new X-ray films.

Lead-containing wastes:-

The lead foil inside X-ray packets and lead aprons contain leachable toxin which can contaminate soil and groundwater in landfill sites after disposal. These should only be handed over to certified biomedical waste carrier (CWC). High doses of lead intake lead to reproductive toxicity, neurotoxicity, carcinogenicity, hypertension, renal function, immunology, toxic kinetics, etc

Blood-soaked/dripping gauze :-

Is a biomedical hazardous waste. It should be enclosed in a yellow biomedical waste bag covered with a double bag, labeled with a biohazard symbol and refrigerated, if onsite for more than 4 days. Once accumulated, certified biomedical waste carrier (CWC) should be contacted for disposal.

Sharps instrument :- Needles, scalpels, glass carpules, burs, acid etch tips, files, blades and other sharp objects): Their waste management includes collection in a red or yellow puncture resistant container with a lid that cannot be removed. The container should be properly labeled with biohazard symbol and once full, the certified biomedical waste carrier (CWC) should be contacted for disposal .(5)

Chemicals, disinfectants, and sterilizing agents :- .

Staff handling these materials should be trained in Workplace Hazardous Materials Information System (WHMIS). Whenever possible, use steam or dry heat to sterilize dental instruments.

Non hazardous waste :-

Paper ,cardboard ,aluminum plastic etc.... their use should be minimized (clean or rinse) Should be recycled where the service exist .

There are several terms used to represent wastes generated from the HCFs such as “medical waste”, “healthcare facility waste”, “biomedical waste”, “regulated medical waste” and “clinical waste” are used frequently in different articles. For this study, we used “medical waste” to represent the entire waste generated from the HCFs. Medical waste management is not well practiced throughout the world and very recently got its attention due to increased awareness of

HIV, HBV and HCV (5). Medical waste can transmit more than 30 highly infectious blood borne microorganisms (6) .

Poor management of health care waste potentially exposes health care workers, waste handlers, patients and the community at large to infection, toxic effects and injuries, and risks polluting the environment. It is essential that all medical waste materials are segregated at the point of generation, appropriately treated and disposed of safely.

Adequate knowledge, proper techniques, and safety practice measures can go a long way toward safe waste disposal and protection of the community from various adverse effects of hazardous waste (7)

Study conducted in India about Awareness of Biomedical Waste Management among Dentists . Medical waste is a total waste which is generated from the healthcare facilities (HCFs) during the course of the healthcare delivery process(2) It includes syringes, needles, ampoules, The aim of the study is to obtain information about knowledge, execution and attitude toward biomedical waste (BMW) and its management.

The main method of the study are a self-administered closed-ended questionnaire, designed to conduct a cross-sectional survey. It was distributed among 614 dentists (institution associated or private practitioners) in the cities of North India.

The questionnaire comprised 36 questions regarding knowledge, execution, and attitude toward BMW and its management. Frequency distribution and chi-square test along with paired t-test were used to compare the data obtained between the private practitioners and institution-associated dentists.

The main results showed that 80% private practitioners were aware of the categories of BMW as compared with 100% of institution-associated dentists. However, 41% dentists associated with institution were disposing the chemical waste directly into sewer and a surprising high number of private practitioners were discarding directly without any treatment. Furthermore, regarding the mandatory maintenance of BMW records, 100% institution-associated respondents were aware, whereas only 6.5% private practitioners knew about it. Regarding BMW management not frequently being followed, 78% of private practitioners believed extra burden as the reason.

Conclusion of the study Most of the dentists had adequate knowledge regarding biomedical waste (BMW) policies and its management. Although it was being practiced in mostly of all the institutes on a regular basis, the majority of private practitioners were not practicing it due to various reasons, such as financial burden, lack of availability of service, and poor attitude toward its management(8)

Knowledge, Attitude, and Practices about Biomedical Waste Management among Healthcare Personnel were assessed in : A Cross-sectional Study conducted by Vanesh Mathur, S Dwivedi, MA Hassan, and RP Misra¹

The objective was to assess knowledge, attitude, and practices of doctors, nurses, laboratory technicians, and sanitary staff regarding biomedical waste management.

The study was conducted among hospitals (bed capacity >100) of Allahabad city. Medical personnel included were doctors (75), nurses (60), laboratory technicians (78), and sanitary staff (70). The main result of study ,doctors, nurses, and laboratory technicians have better knowledge than sanitary staff regarding biomedical waste management. Knowledge regarding the color coding and waste segregation at source was found to be better among nurses and laboratory staff as compared to doctors. Regarding practices related to biomedical waste management, sanitary staff were ignorant on all the counts. However, injury reporting was low across all the groups of health professionals

WHO estimated that, in 2000, injections with contaminated syringes caused 21 million hepatitis B, 2 million hepatitis C and 260,000 HIV infections (9)

In a study conducted by Mannan A (India) to assess the level of knowledge and practice of medical professionals in Shaheed Suhrawardy medical college hospital, Dhaka on hospital waste management. Total 105 respondents were interviewed. Mean age of the respondents was (38.10±10.857) years. About 72.4% was female and 89.5% of respondents were Muslim. Mean years of schooling of the respondents was (11.70±7.846) years and mean income of the respondents was (31914.29±25361.28) tk. About 36.19% was nurses, 28.57% of the respondents were doctors and 35.24% was cleaner. Mean professional experience of the respondents was (12.69±10.92) years. All the respondents had knowledge about hospital waste. About 99% of the respondents had knowledge about Sharpe waste, pathological waste, liquid waste and general waste. About 99% respondents collected hospital waste in specific color container and 98.08%

had knowledge about waste disposal. Near about 97.1% of the respondent's practices of waste disposal was dumping and 99% of them practices incineration as waste disposal. Among them, 92.7% respondents told that the best procedure of waste disposal is dumping. About 98.1% of the respondents had very good knowledge and (94.2%) of them had very good practices. All of the respondents told it was essential to have knowledge about waste disposal. About 45.1% of the respondents told that the source of information about waste disposal was advocacy and seminar, seminar and training. The study found satisfactory knowledge and practices of hospital waste management among the study population. If this level of knowledge and practices are available in every hospital of Bangladesh, both patients and medical professionals will be safe from unwanted infections (10).

A study by Jaswal P (India) revealed that Biomedical waste is waste which produce during diagnosis, treatment (medical, surgical), and immunization. All small and big health care centers are generators of Biomedical Waste Management. There are approximately 75-90% non-risky waste and 10-25% risky waste that cause various injuries and communicable disease. Objectives: To assess the knowledge, practices and reasons of non-compliance among Health care Personnel regarding Biomedical Waste Management; to find out the relationship between knowledge and practices of Health care Personnel regarding bio-medical waste management; to determine the association of Knowledge, Practices with selected variables. Method: Non-experimental descriptive Survey design was used in this study. 148 Health Care Personnel were selected by the total enumeration sampling technique. The tools for data collection were structure Knowledge Questionnaire to assess knowledge, Observation checklist to assess the Practices, Rating Scale to assess the Reasons of non-compliance Biomedical Waste management. Result: Showed that the doctors (32.1%) and nurses (63.6%) had very good level of knowledge and fourth class workers (87.5%) had poor level of knowledge regarding Biomedical Waste Management. doctors (90.9%) and nurses (76.4%) had poor level of Practice while fourth class workers (57.5%) had poor level of Practice. There is no correlation between Knowledge and practice of health care Personnel. The association between knowledge, practices of health care personnel and selected variables was found non- significant at 0.05 level of significance. Conclusion: Knowledge and practices of health care personnel is not adequate insufficient supply of resources, Lack of awareness inadequate man power were reasons of non-compliance regarding biomedical waste management (11)

3- METHODOLOGY

3.1 Study design :-

The study was conducted as a descriptive cross-sectional institutional based .

3.2 Study Area:- Primary health centers with dental clinics in Khartoum locality .

Total number of functioning units were 15 .

Health Centers included in the study:-

| No | Name of the health center |
|----|---------------------------|
| 1. | Alshagra |
| 2. | Algouz |
| 3. | Alsadig Abu Agla |
| 4. | Alsalamabi |
| 5. | Tooti |
| 6. | Alzuhur |
| 7. | Alsagana |
| 8. | Alrayad (Wadha) |
| ٩ | Al Gereif west |
| 1٠ | Alsahafa West (Alzebeir) |
| 1١ | FathAlrahmanAlbashir |
| 1٢ | Railway |
| 1٣ | Alfardous |
| 1٤ | Gabra |
| ١٥ | Ortishi |

3.3 Study Population: General Dentists (17) and dental assistants (9) consultant (1) . A total number of 27 health personnel

3.4. Total coverage of study population (N=27)

3.5 Variables :-

Dependent variable: Knowledge, attitude and Practice of dental personnel

Independent variable: Qualification, years of experience ..

Background variable: age, sex, ..

3.6 Data collection: -

3.6.1 Data collection tools and techniques:

- Interviewing using a questionnaire: A predesigned and pretested Questionnaire was filled through direct interview with all study population. (Annex 1)
- Observation using a check list: check list for collecting observational data on the various aspect of the waste management system in order to analyze the system performance such data and information will cover all phases of the system including storage, collection, transportation and disposal (Annex 2)

3.7 Data analysis:

Data collected was analyze by using the statistical package for social science SPSS version 20, with correlation results . P value was taken as (0.05)

3.8 Ethical Consideration (annex 3)

- Institutional clearance and informed consent
- Verbal consent from the study population .

Chapter Three

RESULTS:

Data was collected from 17 doctors and 9 dental assistant in 15 centers in Khartoum locality

Figure 1: Distribution of the study population according to centers :-

The most equipped health centers with health personnel are Khalid and Alfardous centers with three participants(11.1%)

There are 2 (7.4%) participants in each of :- Alriyad (Wadha) ,Hai Alzohoor, Ortichi, Alsalamabi, Tooti, Alsangana, Sahafa west ,FathElrahmanElbashir and Gabraa centers . Only one (3.7%) participants in each of Elzebier , Algouz, Railway, Greif and Shagra centers .

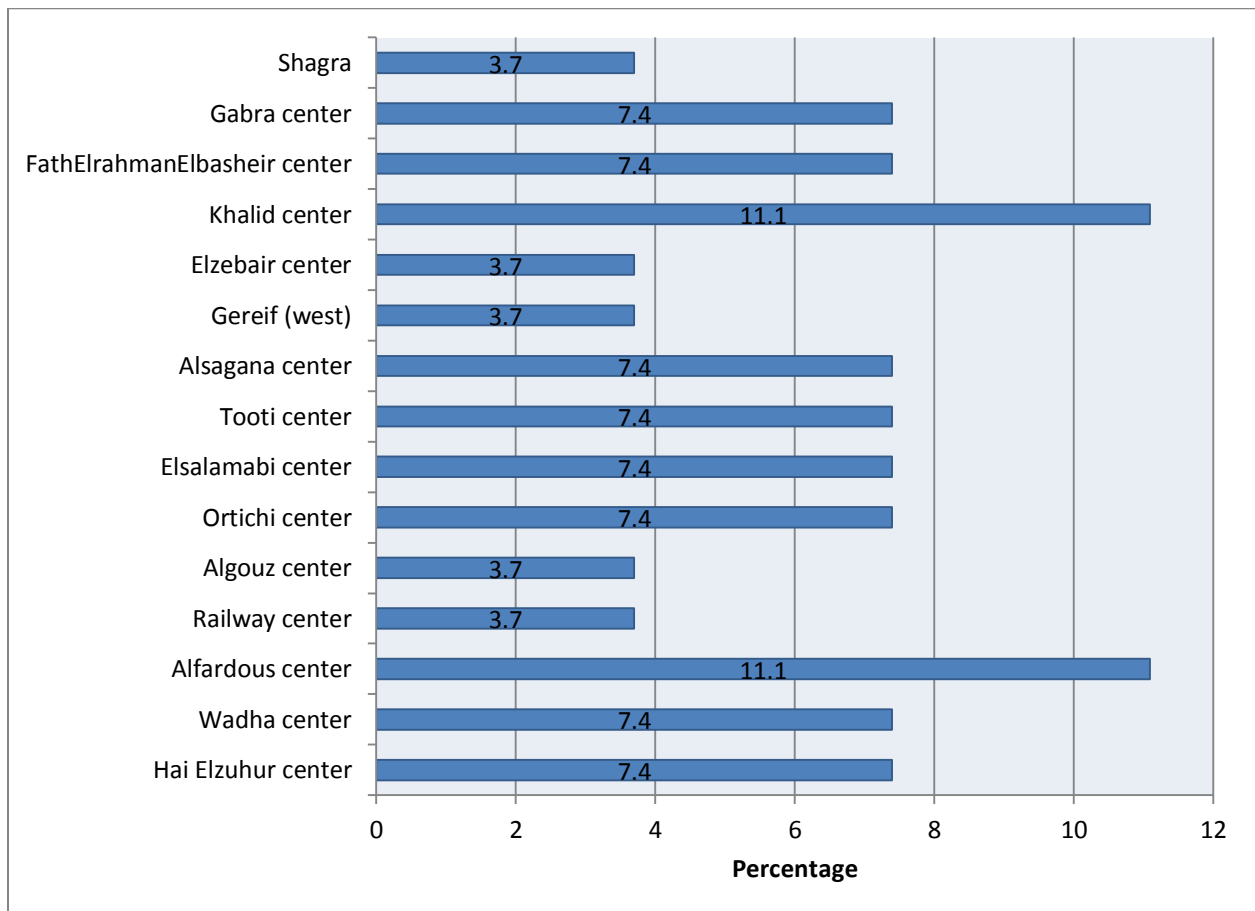


Figure 2: Distribution of the study population according to age

The mean age group is between 31-45 yrs (44%), followed by age group 25-30 yrs (33.3%) and > 45 yrs were 6 (22.2)

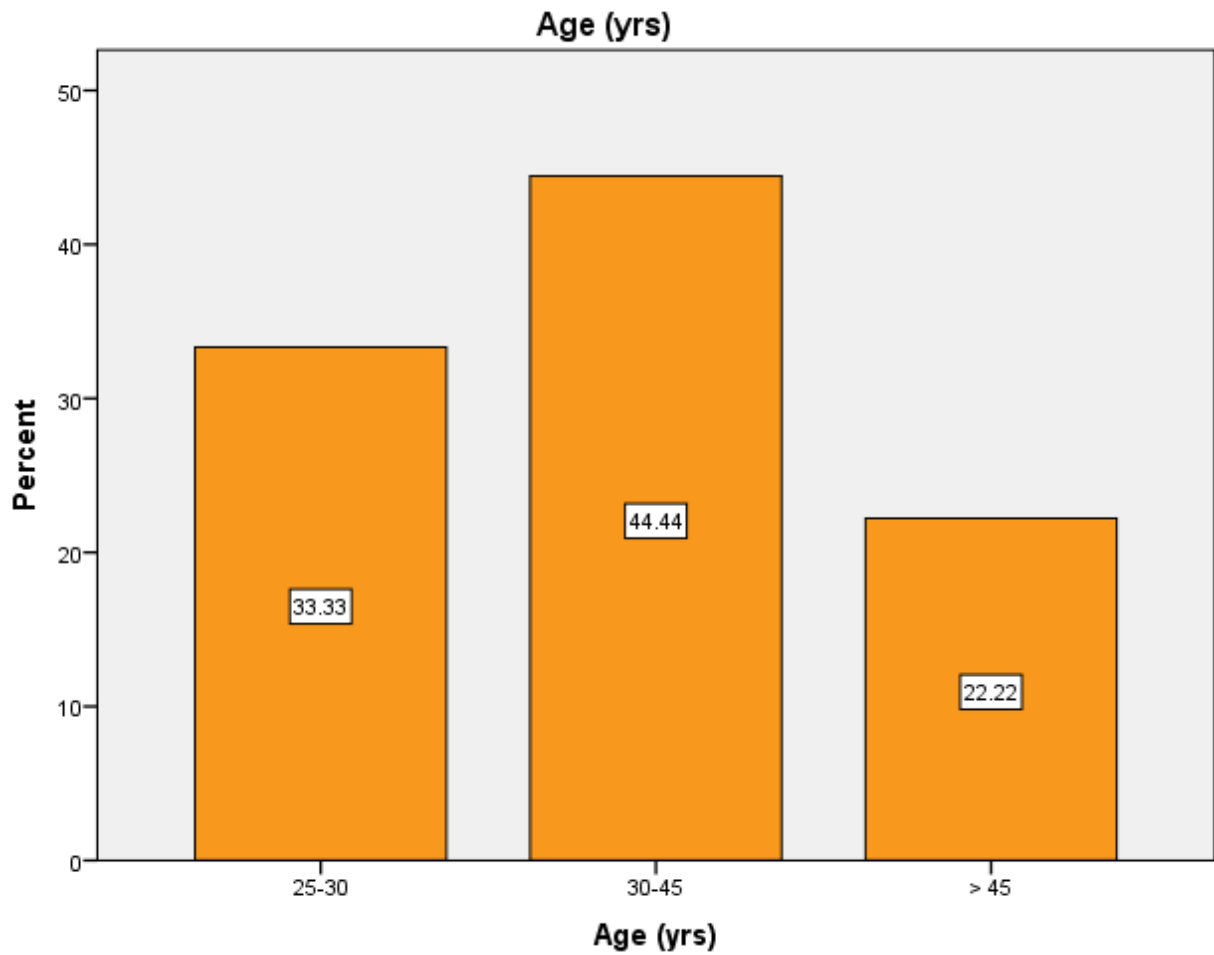


Figure 3: Distribution of study population according to type of health profession:-

Regarding to scientific degree of the participants in the study population, majority were medical officer 17 (63.0%), 9 (33.3%) participants were medical assistant and only one (3.7%) was consultant .

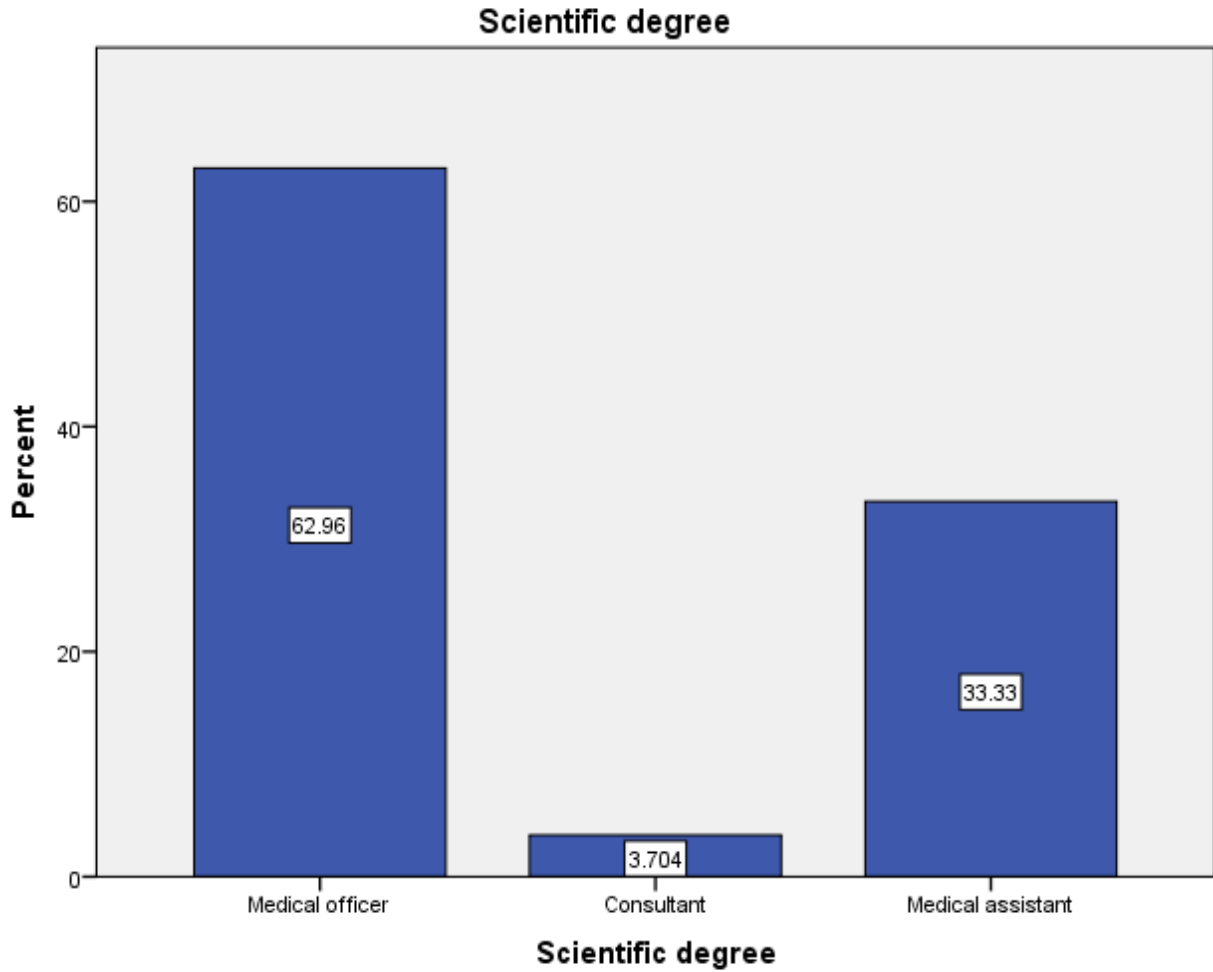


Figure 4: Distribution of total study population according to experience (yrs)

The experience of the majority of the health personnel is between three to ten years (67%) .

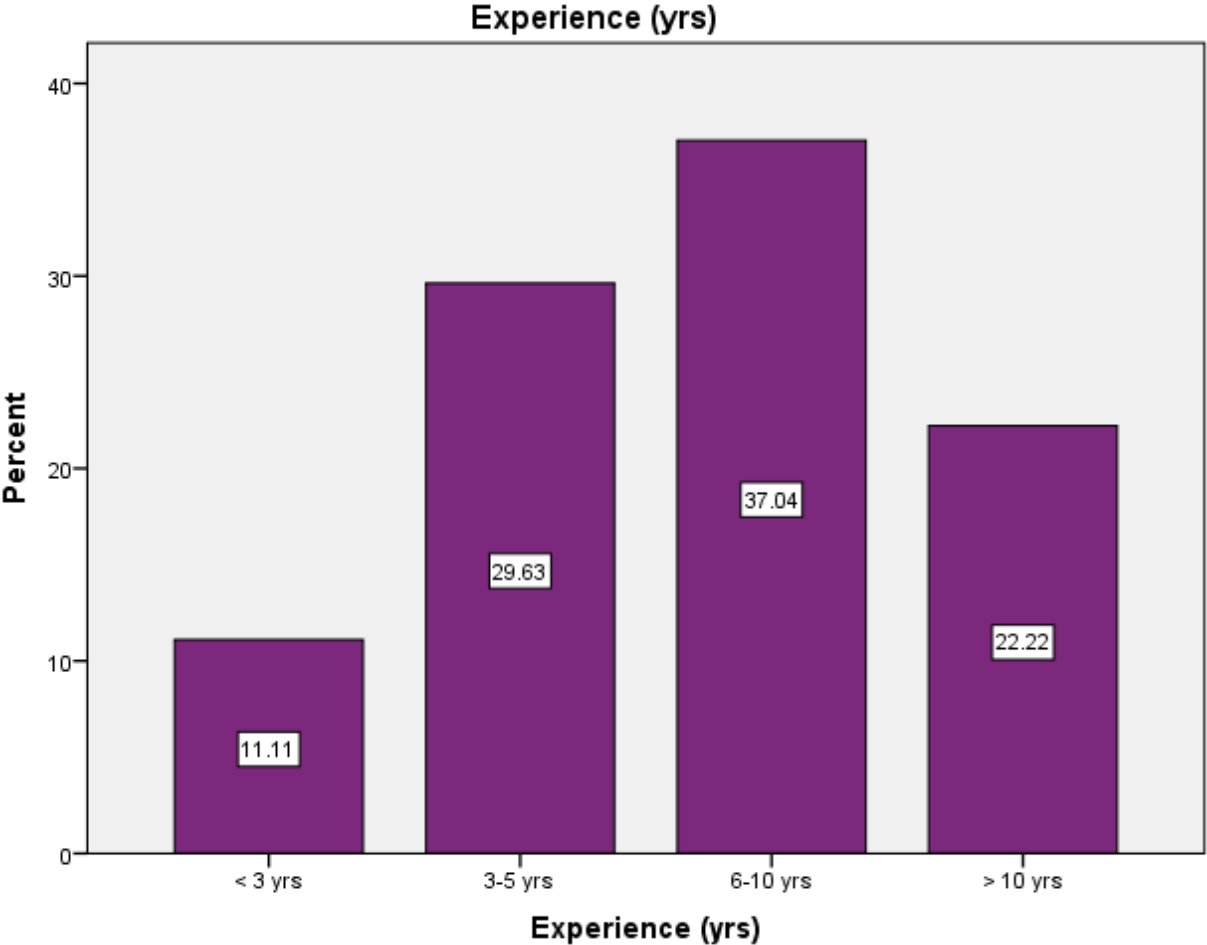


Figure 5: The status of vaccination of the center's workers :-

The majority (92.6%) of doctors were vaccinated against viral hepatitis B while only 63% dental assistants (paramedical) were vaccinated .

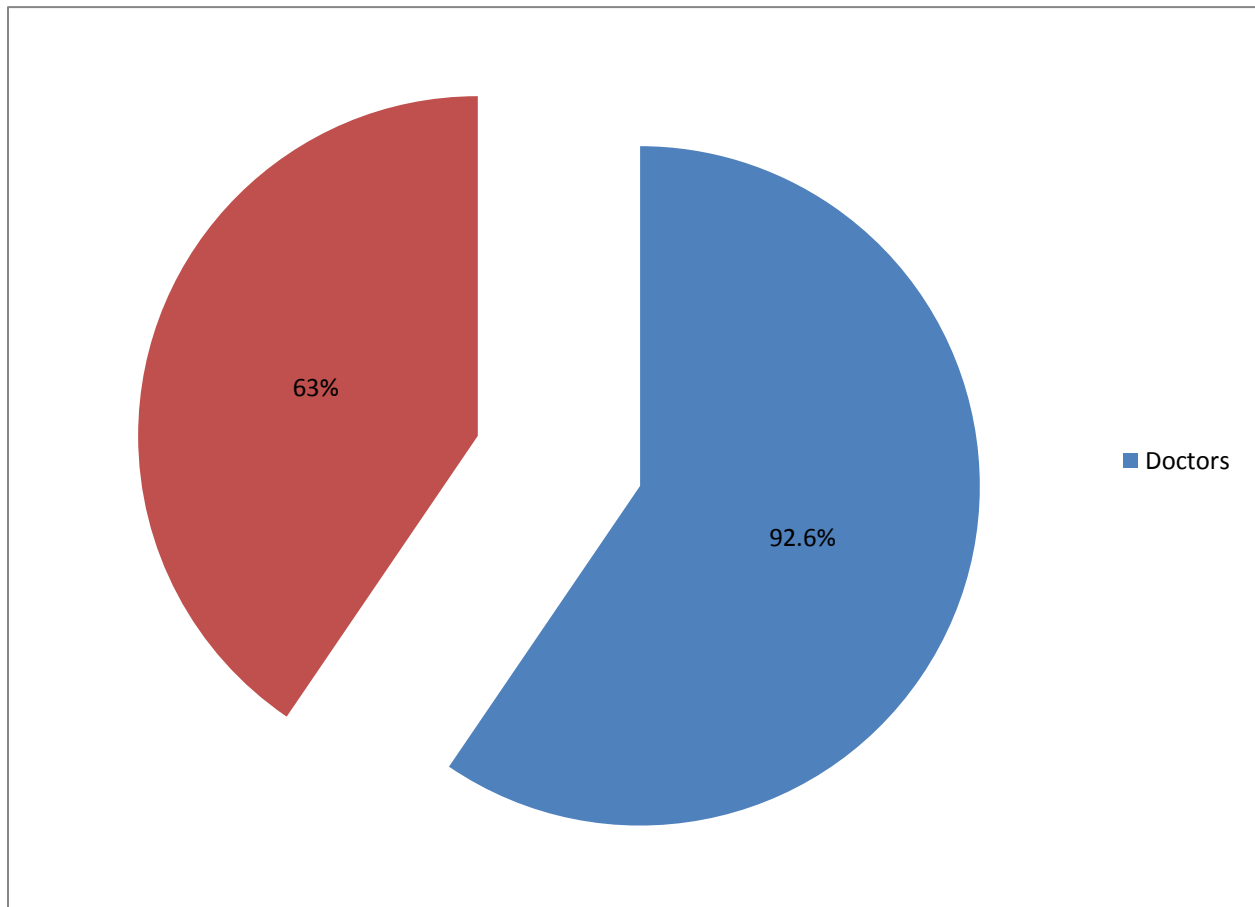
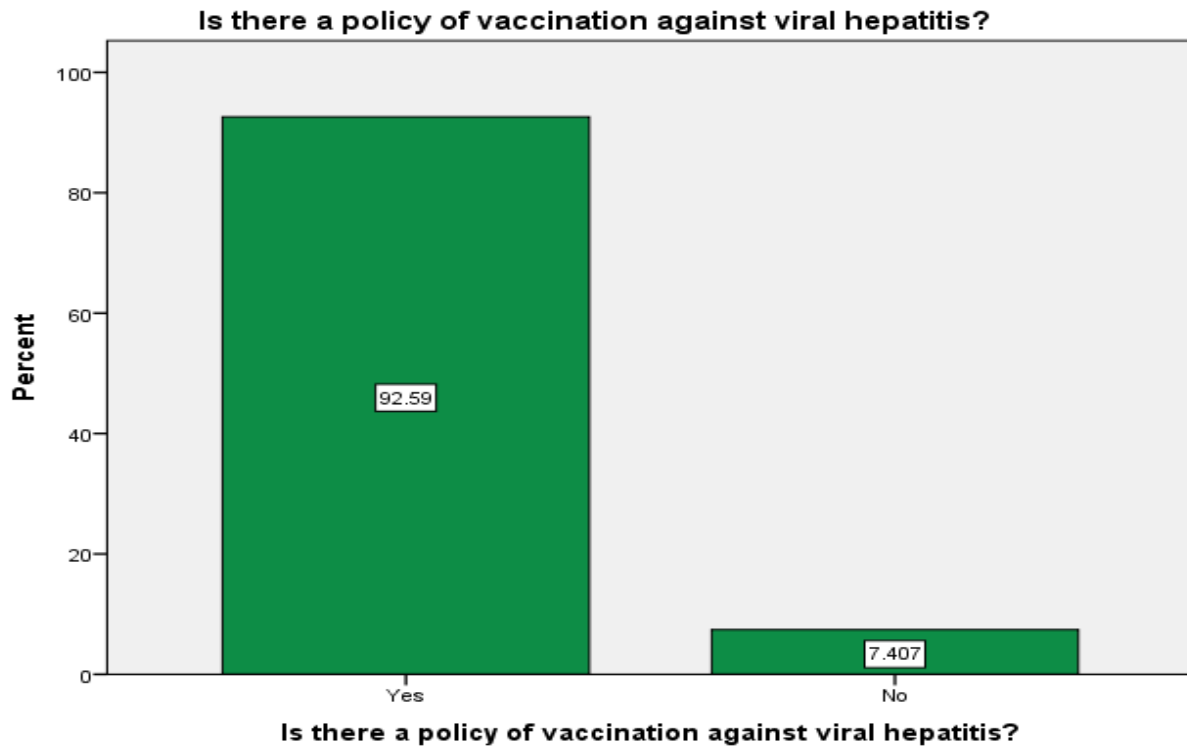


Figure 6: Workers confirming presence of policies for vaccination :-

The majority of the participants confirmed the presence of policy of vaccination against viral hepatitis B (25 Participants (92.6%) only 2 denied (7.4%)



figures 7: schedule of vaccination

In respect to vaccination time; 14 participants = (56.0%) were vaccinated before joining work, and 10 (40.0%) participants vaccinated after joining work and 3 (4.0%) don't know.

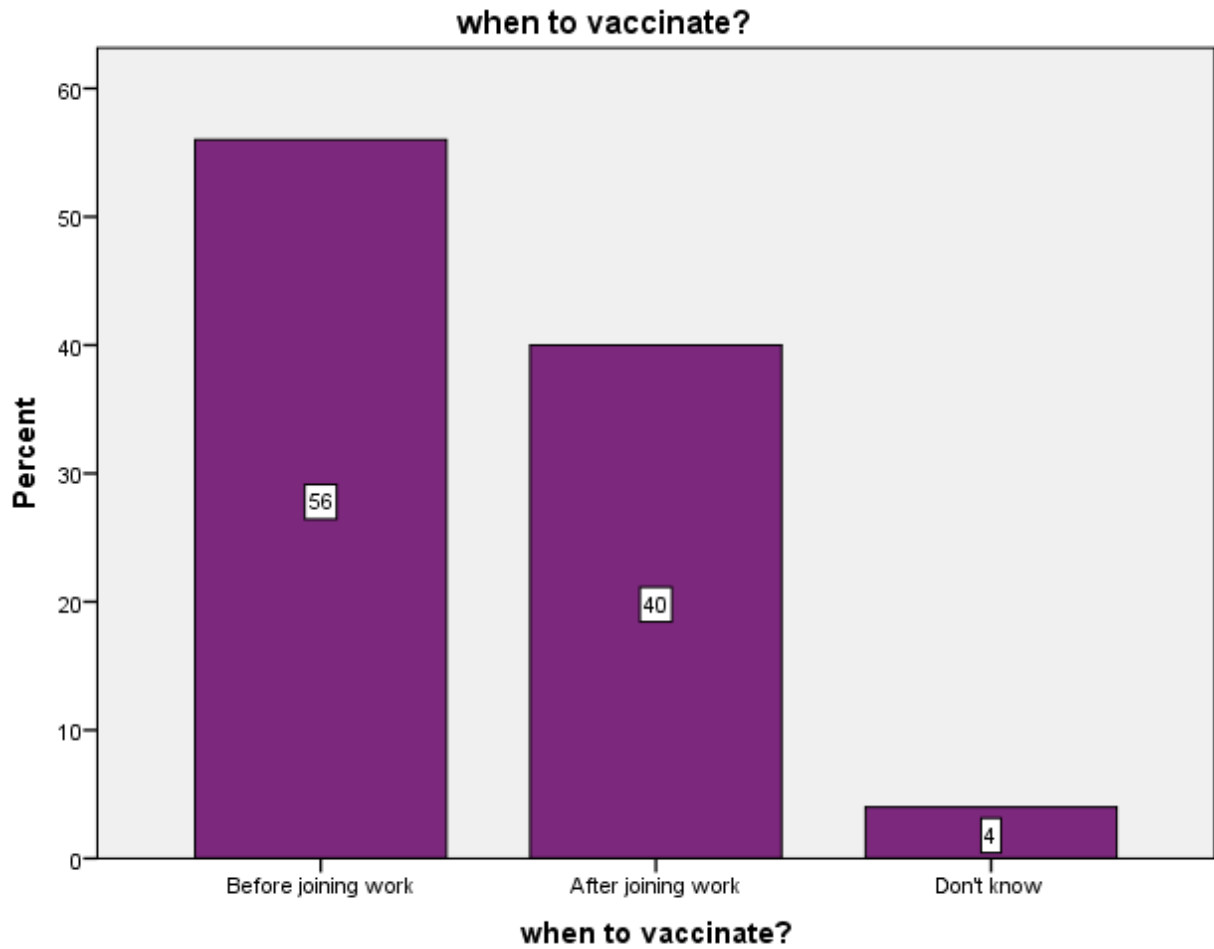


Figure 8 :- guidelines of waste management :-

Most of the workers confirm the presence of guide lines for waste management .(93%)

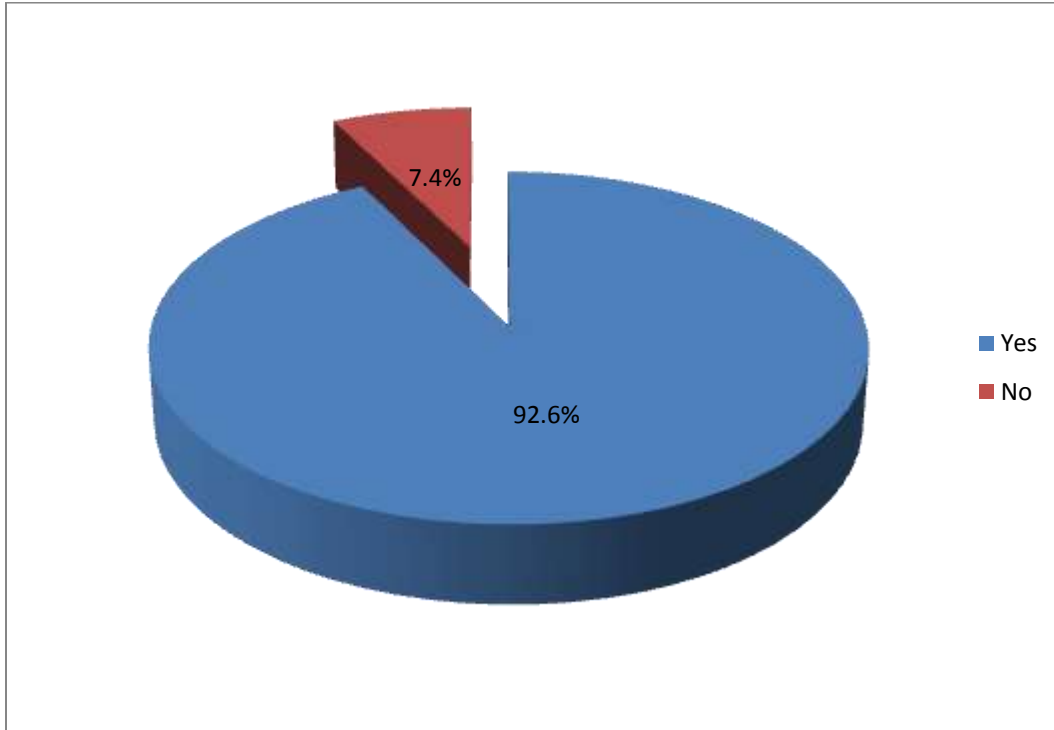


Table 1:- Health Centers included in the study and the distribution of study population in each:-

| No | Name of the health center | No. of Doctors | No. of dental assistants | Total |
|-----|---------------------------|---------------------|--------------------------|-------|
| 1. | Khalid center | 2 | 1 | 3 |
| 2. | Alfardous center | 2 | 1 | 3 |
| 3. | Alriyad (Wadha) | 1 | 1 | 2 |
| 4. | Hai Alzohoor center | 1 | 1 | 2 |
| 5. | Ortichi | 1 | 1 | 2 |
| 6. | Alsalamabi | 1 | 1 | 2 |
| 7. | Tooti | 1 | 1 | 2 |
| 8. | Alsagana | 1 | 1 | 2 |
| 9. | FathElrahmanElbashir | 1 | 1 | 2 |
| 10. | Shagra | 1 | 0 | 1 |
| 11 | Elzebier | 1 | 0 | 1 |
| 12 | Greif(west) | 1 | 0 | 1 |
| 13 | Algooz | 1 | 0 | 1 |
| 14 | Railway | 1 | 0 | 1 |
| 15 | Gabraa | 1 | | 2 |
| 16 | Total | 17 +one consultants | 9 | 27 |

The study shows shortage of technical staff (dental medical officers ,consultants and dental medical assistants) in all health centers as reflected by one dentists in most of health centers and one dental assistants (59%)some health centers have one dentist only without an assistant (22%) (table 1)

This shortage of staff can be reflected on performance of staff .

Table 2 :- Experience of different health personnel

| Experience | Health Personnel | | | | | | | |
|------------|------------------|--------|------------|-------|-------------------|-------|------------|--------|
| | Medical officer | | Consultant | | Medical assistant | | Total | |
| | Frequency` | % | Frequency` | % | Frequency` | % | Frequency` | % |
| 3 yrs | 3 | 100.0% | 0 | 0.0% | 0 | 0.0% | 3 | 100.0% |
| 3-5 yrs | 3 | 37.5% | 0 | 0.0% | 5 | 62.5% | 8 | 100.0% |
| 6-10 yrs | 8 | 80.0% | 0 | 0.0% | 2 | 20.0% | 10 | 100.0% |
| > 10 yrs | 3 | 50.0% | 1 | 16.7% | 2 | 33.3% | 6 | 100.0% |
| Total | 17 | 63.0% | 1 | 3.7% | 9 | 33.3% | 27 | 100.0% |

Most of the medical officers (50%) had 6-10 years of experience .the only one consultant had more than 10 years experience . for the medical assistants 5(62.5) had 3-5 years experience .

Table 3 : The status of vaccination of the center's workers :-

| Workers | No vaccinated | Percent out of total (27) |
|-------------------|---------------|---------------------------|
| Doctors | 17 | 63.0% |
| Assistant doctors | 9 | 33.3% |
| Consultant | 1 | 3.7% |
| Total | 27 | 100.0 |

All staff were vaccinated

Table 4: Presence of infection control committees and their effectiveness at the center .

| | Frequency | percent |
|--|-----------|---------|
| Presence of infection control committee at the center? | | |
| Yes | 5 | 18.5%) |
| No | 22 | 81.5 |
| Total | 27 | 100.0% |
| Effectiveness of the committee ? | | |
| Yes | 5 | 18.5% |
| No | 22 | 81.5 |
| Total | 27 | 100.0% |

From the above table there are no infection control committees in these health centers so they not effective .

Table 5: Results of questionnaires on KAP . :-

| | Frequency | Percent |
|---|------------------|----------------|
| Presence of job description for the employees of the center. | 26 | 96.3 |
| The handling of medical waste done in the way it had been taught. | 25 | 92.6 |
| Training after graduation to deal with medical waste . | 21 | 77.8 |
| Protective equipment and clothing available for the unit . | 27 | 100.0 |
| Using protective tools and clothing on a regular basis . | 25 | 92.6 |

From the above table :- PPT is available and in use . About 22% of the staff were not trained in medical waste management . Twenty six (96.3%) participants acknowledged that waste is collected daily, Majority of participants 25 (92.6%) are using protective tools and clothing on a regular basis, and medical waste sorted from ordinary waste. Only 15 (55.6%) participants follows the coloring code for the disposal containers.

Table 6: Type of training among health -care workers :-

| Type of training | Frequency | Percent |
|---------------------|-----------|---------|
| clinical and theory | 11 | 40.7 |
| Only Theory | 10 | 37.0 |
| Total | 21 | 77.8 |

From the above table :- The table shows that theoretical training is more than practical .
 Out of 21 participants whom were trained 11 (52.4%) of them trained clinically and theoretically and 10 (47.6%) trained theoretically only.

Level of Table 7: practice of dental waste management at the level of health centers:-

| Practice | Frequency | Percent |
|--------------|-----------|---------|
| Good | 19 | 70.4 |
| Valid medium | 6 | 22.2 |
| Poor | 2 | 7.4 |
| Total | 27 | 100.0 |

from the above table :- the table shows medium to good practice of dental medical waste management .

70% of the staff show good practice in medical waste management

22% show medium practice and only 7% show poor practice .

Table 8 :- **Vaccination schedule :-**

| When to vaccinate | Frequency | Percent |
|---------------------|-----------|---------|
| Before joining work | 14 | 51.9 |
| After joining work | 10 | 37.0 |
| Don't know | 3 | 11 |
| Knowledge | 25 | 92.6 |

From the above table :- Most vaccination done mainly before work .

Table 9 :- Summary of attitude of Dental Health Personnel regarding dental medical waste management at the Level of Health Centers – Khartoum locality .

| | Frequency | Percentage |
|---|------------|--------------|
| Policy of vaccination against viral hepatitis | 25 | 92.6 |
| The status of vaccination of the center's workers:- | | |
| Vaccinated (doctor) | 25 | 92.6 |
| Vaccinated Dental Assistants | 17 | 63.0 |
| Completion of vaccine doses:- | | |
| Doctors | 23 | 85.2 |
| Dental Assistants | 19 | 70.4 |
| Disposing of medical waste in an incorrect and non-scientific way can lead to a health problems | 27 | 100.0 |
| To follow the coloring code for the disposal of medical waste | 15 (55.6%) | 11 (40.7%) |
| Attitude | 178 | 77.9% |

Attitude = $544/700 \times 100/100 = 77.9\%$

the above table shows good attitude regarding vaccination but only 85% of doctors and 70% of medical assistants completed their vaccination .

Most of the staff don't follow the coloring code for disposal of medical waste .

Table 10 :- Summary of attitude regarding presence of written guide lines and infection control committees at the Level of Health Centers – Khartoum locality .

| | Frequency | Percentage |
|--|------------------|-------------------|
| Presence of written guidelines that can be consulted when disposing of waste at work | 17 | 63.0 |
| Presence of infection control committee at the centers | 5 | 18.5 |
| Practice | 22 | 40.8 |

Practice = $81.5/200 \times 100 = 40.8\%$

From the above table :- there no infection control committees in these health centers and almost no guide lines .

Table 11 : - Association between age groups and knowledge of health personnel in dental medical waste management

| Age group (yrs) | Knowledge | | | | | |
|-----------------|-----------|---------|-----------|---------|-----------|---------|
| | Good | | Medium | | Poor | |
| | Frequency | percent | Frequency | percent | Frequency | percent |
| 25-30 | 5 | 26.3% | 3 | 50.0% | 1 | 50.0% |
| 30-45 | 9 | 47.4% | 2 | 33.3% | 1 | 50.0% |
| > 45 | 5 | 26.3% | 1 | 16.7% | 0 | 0.0% |
| Total | 19 | 100.0% | 6 | 100.0% | 2 | 100.0% |

P value = 0.23 (Not significant)

There is no association between age groups of health personnel knowledge on dental medical waste management value not significant

Table 12 :- Relationship between scientific degree of health personnel and their knowledge regarding dental medical waste management .

| Scientific degree | Knowledge | | | | | |
|-------------------|-----------|---------|-----------|---------|-----------|---------|
| | Good | | Medium | | Poor | |
| | Frequency | percent | Frequency | percent | Frequency | percent |
| Medical officer | 10 | 52.6% | 5 | 83.3% | 2 | 100.0% |
| Consultant | 1 | 5.3% | 0 | 0.0% | 0 | 0.0% |
| Medical assistant | 8 | 42.1% | 1 | 16.7% | 0 | 0.0% |
| Total | 19 | 100.0% | 6 | 100.0% | 2 | 100.0% |

P value = 0.01 (Significant)

From the above table :- Most of the medical officers and of dental medical assistants show medium to good correlation in knowledge .to dental medical waste management with a significant association P value 0.01 .

Table 13:- Relationship between the experience of health personnel and their knowledge regarding dental medical waste management , in health centers , Khartoum locality

| Experience (yrs) | Knowledge | | | | | | | |
|---------------------|-----------|---------|-----------|---------|-----------|---------|-------|--------|
| | Good | | Medium | | Poor | | total | |
| | Frequency | percent | Frequency | percent | Frequency | percent | Freq. | % |
| < 3 yrs | 1 | 33.3% | 1 | 33.3% | 1 | 33.3% | 3 | 100.0% |
| 3-5 yrs | 7 | 87.5% | 1 | 12.5% | 0 | 0.0% | 8 | 100.0% |
| 6-10 yrs | 7 | 70.0% | 3 | 30.0% | 0 | 0.0% | 10 | 100.0% |
| > 10 yrs | 4 | 66.7% | 1 | 16.7% | 1 | 16.7% | 6 | 100.0% |
| Total | 19 | 70.4% | 6 | 22.2% | 2 | 7.4% | 27 | 100.0% |

P value = 0.35 (Not significant)

The table above shows that there is no significant relationship between experience and knowledge of staff regarding dental medical waste management .

Table 14:- The association between the handling of medical waste done in the way that they were taught and knowledge :-

| handling the same as taught | Knowledge | | | | | | | |
|-----------------------------------|-----------|---------|-----------|---------|-----------|---------|-------|--------|
| | Good | | Medium | | Poor | | total | |
| | Frequency | percent | Frequency | percent | Frequency | percent | Freq. | % |
| Yes | 19 | 76.0% | 5 | 20.0% | 1 | 4.0% | 25 | 100.0% |
| No | 0 | 0.0% | 1 | 100.0% | 0 | 0.0% | 1 | 100.0% |
| so far | 0 | 0.0% | 0 | 0.0% | 1 | 100.0% | 1 | 100.0% |
| Total | 19 | 70.4% | 6 | 22.2% | 2 | 7.4% | 27 | 100.0% |

P value = 0.01 (Significant)

Whether the handling of the medical waste is done the same way the participants had been taught or not , was statistically significant (P Value = 0.01).

Table 15: - The association between the training after graduation to deal with medical waste and knowledge

| Training after graduation to deal with medical waste | Knowledge | | | | | | | |
|--|-----------|---------|-----------|---------|-----------|---------|-------|--------|
| | Good | | Medium | | Poor | | total | |
| | Frequency | percent | Frequency | percent | Frequency | percent | Freq. | % |
| Yes | 18 | 85.7% | 3 | 14.3% | 0 | 0.0% | 21 | 100.0% |
| No | 1 | 16.7% | 3 | 50.0% | 2 | 33.3% | 6 | 100.0% |
| Total | 19 | 70.4% | 6 | 22.2% | 2 | 7.4% | 27 | 100.0% |

P value = 0.01 (Significant)

The association between the training after graduation to deal with medical waste and knowledge is statistically significant with a P.Value 0.01

.There is a significant correlation stress the importance of training on medical waste management among dental health workers

Table 16 :- The association between using a protective tools (PPE) and clothing on a regular basis and knowledge of the staff .

| Using protective tools and clothing on a regular basis | Knowledge | | | | | | | |
|--|-----------|---------|-----------|---------|-----------|---------|-------|--------|
| | Good | | Medium | | Poor | | total | |
| | Frequency | percent | Frequency | percent | Frequency | percent | Freq. | % |
| Yes | 18 | 72.0% | 6 | 24.0% | 1 | 4.0% | 25 | 100.0% |
| No | 1 | 100.0% | 0 | 0.0% | 0 | 0.0% | 1 | 100.0% |
| Sometimes | 0 | 0.0% | 0 | 0.0% | 1 | 100.0% | 1 | 100.0% |
| Total | 19 | 70.4% | 6 | 22.2% | 2 | 7.4% | 27 | 100.0% |

P value = 0.01 (Significant)

The above table show a statistically significant association between using PPE and the knowledge of study population .

Table 17 : - The association between the collection of medical waste on a daily basis and Practice

| medical waste collected on a daily basis | Practice | | | | | | | |
|--|-----------|---------|-----------|---------|-----------|---------|-------|--------|
| | Good | | Medium | | Poor | | total | |
| | Frequency | percent | Frequency | percent | Frequency | percent | Freq. | % |
| Yes | 19 | 73.1% | 6 | 23.1% | 1 | 3.8% | 26 | 100.0% |
| Sometimes | 0 | 0.0% | 0 | 0.0% | 1 | 100.0% | 1 | 100.0% |
| Total | 19 | 70.4% | 6 | 22.2% | 2 | 7.4% | 27 | 100.0% |

∴ P value = 0.01 (Significant)

The relationship between whether the medical waste is collected on daily basis or not , give a positive relationship with the practice of the staff. which is statistically significant . P. Value = (0.01) .

CHECK LIST

On direct observation and the check list reveals the importance of the following points :-

- Use of incinators in management of dental medical waste.
- Availability of funds for deferent processes .
- Boxes for collection of dental medical waste .
- Collection of medical waste ,
- transportation and
- Rules ,for dental medical waste management

Table 1^: Availability of special container for collecting medical waste in health centres

| Health Centre | special containers for collecting medical wastes are available | | |
|--------------------------|--|----|---------|
| | yes | no | somehow |
| alshagara | ✓ | | |
| algouz | ✓ | | |
| alsadig abo agla | ✓ | | |
| alsalamabi | ✓ | | |
| tooti | ✓ | | |
| alzuhur | ✓ | | |
| alsaggana | ✓ | | |
| alrayad (wadha) | ✓ | | |
| algereif west | ✓ | | |
| alsahafa west (alzebeir) | ✓ | | |
| fathalrahman albashir | ✓ | | |
| railway | ✓ | | |
| alfardous | ✓ | | |
| gabra | ✓ | | |
| ortishi | ✓ | | |

Table 19 Availability of containers for sharp waste in health centers :-

| Health Center | special containers for collecting sharp wastes are available | | |
|--------------------------|--|----|---------|
| | yes | no | somehow |
| alshagara | ✓ | | |
| algouz | ✓ | | |
| alsadig abo agla | ✓ | | |
| alsalamabi | ✓ | | |
| tooti | ✓ | | |
| alzuhur | ✓ | | |
| alsaggana | ✓ | | |
| alrayad (wadha) | ✓ | | |
| algereif west | ✓ | | |
| alsahafa west (alzebeir) | ✓ | | |
| fathalrahman albashir | ✓ | | |
| railway | ✓ | | |
| alfardous | ✓ | | |
| gabra | ✓ | | |
| ortishi | ✓ | | |

Table 20 present of enough containers in health centers:-

| Health Center | the containers are enough for daily usage | | |
|--------------------------|---|----|---------|
| | yes | no | somehow |
| alshagara | ✓ | | |
| algouz | ✓ | | |
| alsadig abo agla | ✓ | | |
| alsalamabi | ✓ | | |
| tooti | ✓ | | |
| alzuhur | ✓ | | |
| alsaggana | ✓ | | |
| alrayad (wadha) | ✓ | | |
| algereif west | ✓ | | |
| alsahafa west (alzebeir) | ✓ | | |
| fathalrahman albashir | ✓ | | |
| railway | ✓ | | |
| alfardous | ✓ | | |
| gabra | ✓ | | |
| ortishi | ✓ | | |

Table 21 presents of containers in suitable places in health centers:-

| Health Center | all of the containers are located in the suitable places | | |
|--------------------------|--|----|---------|
| | yes | no | somehow |
| alshagara | ✓ | | |
| algouz | ✓ | | |
| alsadig abo agla | ✓ | | |
| alsalamabi | ✓ | | |
| tooti | ✓ | | |
| alzuhur | ✓ | | |
| alsaggana | ✓ | | |
| alrayad (wadha) | ✓ | | |
| algereif west | ✓ | | |
| alsahafa west (alzebeir) | ✓ | | |
| fathalrahman albashir | ✓ | | |
| railway | ✓ | | |
| alfardous | ✓ | | |
| gabra | ✓ | | |
| ortishi | ✓ | | |

Table 22 Sorting out of sharp instrument in health centers:-

| Health Centre | the sharp instruments are being sorted out by the physician or his assistant | | |
|--------------------------|--|----|---------|
| | yes | no | somehow |
| alshagara | ✓ | | |
| algouz | ✓ | | |
| alsadig abo agla | ✓ | | |
| alsalamabi | ✓ | | |
| tooti | ✓ | | |
| alzuhur | ✓ | | |
| alsaggana | ✓ | | |
| alrayad (wadha) | ✓ | | |
| algereif west | ✓ | | |
| alsahafa west (alzebeir) | ✓ | | |
| fathalrahman albashir | ✓ | | |
| railway | ✓ | | |
| alfardous | ✓ | | |
| gabra | ✓ | | |
| ortishi | ✓ | | |

Table 23 Proper sorting out of normal waste in health centers:-

| Health Center | the normal wastes are sorted out and they are properly placed right after being used | | |
|--------------------------|--|----|---------|
| | yes | no | somehow |
| alshagara | ✓ | | |
| algouz | ✓ | | |
| alsadig abo agla | ✓ | | |
| alsalamabi | ✓ | | |
| tooti | ✓ | | |
| alzuhur | ✓ | | |
| alsaggana | ✓ | | |
| alrayad (wadha) | ✓ | | |
| algereif west | ✓ | | |
| alsahafa west (alzebeir) | ✓ | | |
| fathalrahman albashir | ✓ | | |
| railway | ✓ | | |
| alfardous | ✓ | | |
| gabra | ✓ | | |
| ortishi | ✓ | | |

Table 24 Proper returned back sharp instrument after operation in health centers:-

| Health Center | the sharp instrument s are adequately returned back after operation | | |
|--------------------------|---|----|---------|
| | yes | no | somehow |
| alshagara | ✓ | | |
| algouz | ✓ | | |
| alsadig abo agla | ✓ | | |
| alsalamabi | ✓ | | |
| tooti | ✓ | | |
| alzuhur | ✓ | | |
| alsaggana | ✓ | | |
| alrayad (wadha) | ✓ | | |
| algereif west | ✓ | | |
| alsahafa west (alzebeir) | ✓ | | |
| fathalrahman albashir | ✓ | | |
| railway | ✓ | | |
| alfardous | ✓ | | |
| gabra | ✓ | | |
| ortishi | ✓ | | |

Table 25 Disposal of medical waste in health centers:-

| Health Center | medical wastes are collected and disposed off the clinic | | |
|--------------------------|--|----|---------|
| | yes | no | somehow |
| alshagara | ✓ | | |
| algouz | ✓ | | |
| alsadig abo agla | ✓ | | |
| alsalamabi | ✓ | | |
| tooti | ✓ | | |
| alzuhur | ✓ | | |
| alsaggana | ✓ | | |
| alrayad (wadha) | ✓ | | |
| algereif west | ✓ | | |
| alsahafa west (alzebeir) | ✓ | | |
| fathalrahman albashir | ✓ | | |
| railway | ✓ | | |
| alfardous | ✓ | | |
| gabra | ✓ | | |
| ortishi | ✓ | | |

Table 26 Methods of placing of waste in health centers

| Health Center | the wastes are placed in the containers in a correct and scientific way | | |
|--------------------------|---|----|---------|
| | yes | no | somehow |
| alshagara | ✓ | | |
| algouz | ✓ | | |
| alsadig abo agla | ✓ | | |
| alsalamabi | ✓ | | |
| tooti | ✓ | | |
| alzuhur | ✓ | | |
| alsaggana | ✓ | | |
| alrayad (wadha) | ✓ | | |
| algereif west | ✓ | | |
| alsahafa west (alzebeir) | ✓ | | |
| fathalrahman albashir | ✓ | | |
| railway | ✓ | | |
| alfardous | ✓ | | |
| gabra | ✓ | | |
| ortishi | ✓ | | |

Table 27 Methods of storage waste in health centers:-

| Health Center | the wastes are moved to storage room right after being collected | | |
|--------------------------|--|----|---------|
| | yes | no | somehow |
| alshagara | ✓ | | |
| algouz | ✓ | | |
| alsadig abo agla | ✓ | | |
| alsalamabi | ✓ | | |
| tooti | ✓ | | |
| alzuhur | ✓ | | |
| alsaggana | ✓ | | |
| alrayad (wadha) | ✓ | | |
| algereif west | ✓ | | |
| alsahafa west (alzebeir) | ✓ | | |
| fathalrahman albashir | ✓ | | |
| railway | ✓ | | |
| alfardous | ✓ | | |
| gabra | ✓ | | |
| ortishi | ✓ | | |

Table 28Duration of storage of waste in health centers:-

| Health Center | the medical wastes are not left more than one day | | |
|--------------------------|---|----|---------|
| | yes | no | somehow |
| alshagara | ✓ | | |
| algouz | ✓ | | |
| alsadig abo agla | ✓ | | |
| alsalamabi | ✓ | | |
| tooti | ✓ | | |
| alzuhur | ✓ | | |
| alsaggana | ✓ | | |
| alrayad (wadha) | ✓ | | |
| algereif west | ✓ | | |
| alsahafa west (alzebeir) | ✓ | | |
| fathalrahman albashir | ✓ | | |
| railway | ✓ | | |
| alfardous | ✓ | | |
| gabra | ✓ | | |
| ortishi | ✓ | | |

Table 29 Frequency of collecting waste in health centers:-

| Health Center | the truck which collects the medical wastes is coming regularly | | |
|--------------------------|---|----|---------|
| | yes | no | somehow |
| alshagara | ✓ | | |
| algouz | ✓ | | |
| alsadig abo agla | ✓ | | |
| alsalamabi | ✓ | | |
| tooti | ✓ | | |
| alzuhur | ✓ | | |
| alsaggana | ✓ | | |
| alrayad (wadha) | ✓ | | |
| algereif west | ✓ | | |
| alsahafa west (alzebeir) | ✓ | | |
| fathalrahman albashir | ✓ | | |
| railway | ✓ | | |
| alfardous | ✓ | | |
| gabra | ✓ | | |
| ortishi | ✓ | | |

4- DISCUSSION

A total number of 27 respondents were interviewed. The discussion obtained from the analysis conducted on the data that were collected using self-administered questionnaire as well as in view of the objectives to assess the level of knowledge and practices of health workers on dental waste management .

The study showed that most equipped centers with health personnel are Khalid and Alfardous as each has three participants (11%) compared to one to two persons in all other health centers. This poor staffing of the health centers could affect the performance . This shows shortage of technical staff (dental medical officers ,consultants and dental medical assistants) in all healthcenters as reflected by one dentist in most of health centers and one dental assistants (59%)some health centers have one dentist only without an assistant (22%) (table 1)

This shortage of staff can be reflected on performance of staff .

The main age group of the participants is between 30-45years ,

Regarding to scientific degree of the participants in the study population, majority were medical officer 17 (63.0%), (figure(3)). . As these medical officers are the medical team leaders their number is important . . In contrary the study conducted by Hakim SA, (2018) in his research of biomedical waste management found that the doctors were only (32.1%)

All staff were vaccinated (figure3).. Most of workers were fully vaccinated before joining the work (56%) .While 40% were vaccinated after joining the work .figure(7). Compared to study by Deress T (Ethiopia) revealed in that vaccination Waste handlers are required to be vaccinated for HBV and tetanus (3, 23); however, in this study, only 20% and 40% of them were vaccinated for HBV and tetanus toxoid, respectively.

Experience of doctors are better than medical assistance as all of them had an experience of >3 years (.table 2) ..

There are no infection control committees in these health centers and so they not effective .table(4) .the presence of these committees is an important part of follow up for infection control .The theoretical training is more than practical training which is more important .(table 4b)

Table 5 shows a level of medium to good practice among the centers staff in Khartoum locality compared to poor level of practice in a study conducted in India about Awareness of Biomedical Waste Management among Dentists . The aim of the study is to obtain information about knowledge, execution and attitude toward biomedical waste (BMW) and its management.(8) The show good attitude regarding vaccination but only 85% of doctors and 70% of medical assistants completed their vaccination .(table 7)

There is no association between age groups of health personnel knowledge on dental medical waste management P. Value not significant (Table 9) .

Most of the staff don't follow the coloring code for disposal of medical waste .

Table 12 show significant association between training of the study population and their knowledge on dental medical waste management .This significant correlation stress the importance of training on medical waste management among dental health workers .

Medical waste handling is a hazardous activity and it needs the use of proper PPE; Using protective tools and clothing on a regular basis (PPE) showed a statically significant correlation with a P Value of (0.01) . the results reflects the high awareness of the staff on the hazardous nature of the medical waste and the importance of using PPE to protect themselves (Table 13)

The relationship between whether the medical waste is collected on daily basis or not , shows a positive relationship with the practice of the staff , which is statistically significant . P. Value = (0.01) (Table 14)

Conclusion

- The study reveal that the majority of the health workers had good knowledge about dental medical waste management .
- The attitude of the health personnel is also good while the practice is poor .
- The main factors affecting the KAP of the workers are
 - Training
 - health personnel categories

Recommendations

- 1) In-service training about medical waste management - A plan should be developed for training and the training should include use of incinerators .
- 2) Specific funds should be allocated for incinerators .
- 3) Biomedical waste should not be mixed with the municipal waste and special vehicles should be used for their collection ,and transport .
- 4) There should be strict rules ,policies and guideline for biomedical wastes management .
- 5) Biomedical waste management should be established in each district .
- 6) health personnel staff should wear PPE .
- 7) Infection control personnel should be assigned in each dental unit .

References

1. Sudeep CB, Joseph J, Chaitra T, Joselin J, Nithin P, Jose J. KAP study to assess biomedical waste management in a dental college in south India. *World J Pharm Pharm Sci.* 2017;6:1788–1794. [[Google Scholar](#)]
2. Ola-Adisa EO, Mangden YE, Sati YC, Adisa JO. Knowledge, attitudes/beliefs and practices in medical waste management-an appraisal of Jos North LGA, Plateau State, Nigeria. *Int J.* 2015;2:43–56. [[Google Scholar](#)]
3. Chartier Y, Emmanuel J, Pieper U, Prüss A, Rushbrook P, Stringer R, et al. Safe management of wastes from health-care activities. 2. Geneva: World Health Organization (WHO); 2014. [[Google Scholar](#)]
4. Babu BR, Parande AK, Rajalakshmi R, Suriyakala P, Volga M. Management of biomedical waste in India and other countries: a review. *J Int Environ Appl Sci.* 2009;4:65–78. [[Google Scholar](#)]
5. Kumar M, Singh RK, Umesh VR. Awareness and practices about biomedical waste among healthcare workers in tertiary care hospital of Haldwani, Nainital. *Natl J Med Res.* 2015;159:72–73. [[Google Scholar](#)]
6. Sawalem M, Selic E, Herbell JD. Hospital waste management in Libya: a case study. *Waste Manag.* 2009;29:1370–1375. doi: 10.1016/j.wasman.2008.08.028. [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]

7. Siddharudha S, Sowmyashree H. Occupational exposure to infection: a study on healthcare waste handlers of a tertiary care hospital in South India. *J Assoc Physicians India*. 2015;63:24–27. [[PubMed](#)] [[Google Scholar](#)]
8. Ruth S. Medical waste and human rights. Health care without harm. Submission to the UN human rights council special rapporteur. 2011.
9. Padmaja K. Knowledge, attitude, practice regarding hospital waste management among interns & nurses of tertiary care hospitals of Navi Mumbai. *Sch J Appl Med Sci*. 2017;5:526–530. [[Google Scholar](#)]
10. Alemayehu T, Worku A, Assefa N. Medical waste collectors in eastern Ethiopia are exposed to high sharp injury and blood and body fluids contamination. *J Prev Infect Control*. 2016;2:1–9. doi: 10.21767/2471-9668.100016. [[CrossRef](#)] [[Google Scholar](#)]
11. Adogu P, Ubajaka C, Nebuwa J. Knowledge and practice of medical waste management among health workers in a Nigerian general hospital. *Asian J Sci Technol*. 2014;5:833–838. [[Google Scholar](#)]
12. Central Statistical Authority (CSA) National Statistics Abstract. Addis Ababa, Ethiopia. 2010.
13. Teshager FA, Engeda EH, Worku WZ. Knowledge, practice, and associated factors towards prevention of surgical site infection among nurses working in Amhara regional state referral hospitals, northwest Ethiopia. *Surg Res Pract*. 2015;2015:1–5. doi: 10.1155/2015/736175. [[PMC free article](#)] [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]

- 14- Healthcare waste management directive. Addis Ababa Ethiopia Addis Ababa, Ethiopia: Ethiopia Food, Medicine and Health Care Administration and Control Authority (FMHACA); 2005.
- 15- Neeraj KG, Mukesh S, Shantanu T. Knowledge, attitude and practices of biomedical waste management among health care personnel in selected primary health care centres in Lucknow. *Int J Community Med Public Health*. 2016;3:309–313. [[Google Scholar](#)]
- 16- Solomon R, Shreenivas S. Assessment of knowledge, attitude, practices of biomedical waste management among healthcare personnel. *Sch J Appl Med Sci*. 2017;5:3427–3431.
- 17- Sarker MA, Harun OR, Hirosawa T, Hai MS, Siddique MR, Sakamoto J, et al. Evaluation of knowledge, practices, and possible barriers among healthcare providers regarding medical waste management in Dhaka, Bangladesh. *Med SciMonitInt Med J ExpClin Res*. 2014;20:1–8. [[PMC free article](#)] [[PubMed](#)] [[Google Scholar](#)]
- 18- Sanjay KB, Avinash K, Siddhant K, Meghana R, Akshay SN, Veena GK, et al. Knowledge, attitude and practices regarding biomedical waste management among staff of a tertiary healthcare center in coastal Karnataka. *J Public Health Res*. 2014;2:20–24. [[Google Scholar](#)]
- 19 Nagaraju B, Padmavathi GV, Puranik DS, Shantharaj MP, Sampulatha SP. A study to assess the knowledge and practice on bio-medical waste management among the health care providers working in PHCs of Bagepalli Taluk with the view to prepare informational booklet. *International Journal of Medicine and Biomedical Research*. 2013; 2(1):28, www.ijmbr.com.
- 20- Ola-Adisa EO, Elijah Mangden, YPE, Sati YC, Adisa JO. Knowledge, Attitudes/Beliefs and Practices in Medical Waste Management - An Appraisal of Jos North LGA, Plateau State, Nigeria. *International Journal of Research in Humanities and Social Studies*. 2015; 2(12):43-56.

21-WHO. Healthcare waste management. World Health Organization: www.healthcarewaste.org, 2005.

22- Pinto, et al. A comparative study of knowledge and attitudes regarding biomedical waste (BMW) management with a preliminary intervention.

International Journal of Medicine and Public Health. 2014; 4:91-95.

23- . Mathur V, Dwivedi S, Hassan MA, Misra RP. Knowledge, attitude and practices about Biomedical Waste Management among health care personnel: A cross sectional study. Indian Journal of Community Medicine. 2011; 36:143-5.

24 Sood AG, Sood A. Dental perspective on biomedical waste and mercury management: A knowledge, attitude and practice survey. Ind J Dent Res. 2011; 22:371-5.

25 Jatau AA. Knowledge, Attitudes and Practices Associated with Waste Management in Jos South Metropolis, Plateau State. Mediterranean Journal of Social Sciences of Rome. 2013; 4(5):119- Doi:10.5901/mjss.2013.v4n5p119, 2013.

26-WHO. Healthcare waste management. World Health Organization: www.healthcarewaste.org, 2005.

27-Swapna Muthusamy S, Easow JM. A study on knowledge, attitude and practice of biomedical waste management among health care workers in a Tertiary Care Hospital in Puducherry. <http://www.researchgate.net/publication>. Accessed in October 2019.

28- Mannan A. Assess Knowledge, Practices and Reasons for Non-Compliance Regarding Biomedical Waste Management among Health Care Personnel in Selected Health Care Centers of North India. <http://www.researchgate.net/profile/pooja>. Accessed in Sept. 2019.

Annexes

1- Consent English and Arabic

2 - Questionnaire

3-check list