ASSESSMENT OF INHALER ADHERENCE AND FACTORS ASSOCIATED WITH NON ADHERENCE AMONG ASTHMATIC PATIENTS AT MUHIMBILI NATIONAL HOSPITAL

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ASSESSMENT OF INHALER ADHERENCE AND FACTORS ASSOCIATED WITH NON ADHERENCE AMONG ASTHMATIC PATIENTS AT MUHIMBILI NATIONAL HOSPITAL

By

Amina Omary

A Dissertation Submitted in (Partial) Fulfillment of the Requirements for the Degree of Masters of Medicine (Internal Medicine) of

Muhimbili University of Health and Allied Sciences

October, 2019

CERTIFICATION

The undersigned certify that they have read and hereby recommend for examination of dissertation titled: ***''Assessment of inhaler adherence and factors associated with non adherence among asthmatic patients at Muhimbili National Hospital",*** in (partial) fulfillment of the requirements for the degree of Master of Medicine (Internal Medicine) of Muhimbili University of Health and Allied Sciences.

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(Co – Supervisor)

Date: _____

DECLARATION AND COPYRIGHT

I, **Amina Omary**, declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other university for a similar or any other degree award.

Signature_____ **Date**_____

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DEDICATION

To my beloved mother Mwanaid Iboma and my late father Omary Muhomi who laid the foundation of my carrier. My special dedication is addressed to my lovely husband Mr.Shaban H.Nyambi, my children Asmaa Shaban and Abdulatif Shaban and the entire family for the prayers and patience during the time I was undertaking this academic endeavor.

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OPERATIONAL DEFINITIONS

1. Adherence: The degree to which person's behavior corresponds with the agreed recommendations from a health care provider.
2. Intentional medication non-adherence: Active process whereby the patient chooses to deviate from the treatment regimen.
3. Unintentional medication non-adherence: Is a passive process whereby patients fail to adhere to prescribing instructions through forgetfulness, carelessness, or circumstances out of their control (e.g., health literacy, medication cost and out of supplies).
4. Reliever (Rescue) medication: These are medications given to relieve acute asthma symptoms or attacks very quickly by opening the airways. The rescue medications are best for treating sudden asthma symptoms, also used before exercise to prevent excise-induced bronchi-constriction.
5. Controller (Preventer) medication: Controller medications work over a period of time to reduce airway inflammation and help prevent asthma symptoms from occurring.
6. Asthma control: Defined as the extent to which the various manifestations of asthma have been reduced or removed by treatment. This includes two components: The level of clinical asthma control, which is gauged from features such as symptoms and the extent to which the patient can carry out activities of daily living and achieve optimum quality of life; and the risk of future adverse events including loss of control, exacerbations, accelerated decline in lung function, and side effects of treatment.
7. Asthma Control Test (ACT**):** Is a five question health survey used to measure asthma control in individuals 12 years of age or older. ACT is an efficient, reliable, and valid method of measuring asthma control with or without lung functioning measures such as spirometry. It is a patient-centered questionnaire that recalls the patient's experience of five items: asthma symptoms (nocturnal and daytime), the use of rescue medications, the effect of asthma on daily functioning, and the patient's perception of asthma control over the previous 4 weeks. Each item includes five response options corresponding to a 5-point rating scale. Responses

for each of the 5 items are summed to yield a score ranging from >25 as totally controlled, 20-25 as well controlled, and <20 as uncontrolled.

8. Test of Adherence to Inhalers (TAI) questionnaire**:** TAI consists of two complementary questionnaires: the 10-item TAI designed to identify non-adherent patients and to establish the non-adherence level, whereas the 12-item TAI questionnaire (for health care professional) was designed to guide clinically the non-adherence patterns. In the present study, we only use the 10-item TAI questionnaire. This includes (patient domain) self-administered and scored from 1 to 5 (1 = worst possible score; 5 = best possible score). The total score for the 10-item questionnaire ranges from 10–50. Adherence is rated as good (score: 50), intermediate (score: 46–49), or poor (score :< 45).
9. Persistent asthma: Is the type of asthma in which an individual has symptoms regularly. Persistent asthma can be mild, moderate, or severe depending on frequency of symptoms and measurement of lung function.

LIST OF ABBREVIATIONS

COPD	Chronic Obstructive Lung Disease
PMDIs	Pressured meter dose Inhaler(s)
GINA	The Global Initiative for Asthma Management
ICS	Inhaled Corticosteroid(s)
LABA	Long Acting ß2-Agonist
LAMA	Long Acting Muscarinic Antagonist
MNH	Muhimbili National Hospital
SABA	Short Acting ß2-Agonist
SAMA	Short Acting Muscarinic Antagonist
WHO	World Health Organization

ABSTRACT

Background: Bronchial asthma is a chronic inflammatory disorder of the airways characterized by variable and frequent symptoms of airflow obstruction, bronchial hyper responsiveness, and an underlying inflammation. Asthma is characterized by repeated attacks of shortness of breath and wheezing, that vary in severity and frequency from person to person.

The most effective long-term controller medicines available are inhaled corticosteroids. Despite the availability of highly effective pharmacotherapy, non adherence with this treatment is very common with rate ranging from 30% to 70%. Non adherence however is associated with poor symptom control, higher health care utilization and healthcare cost and reduction in health related quality of life. In Tanzania, prevalence of inhaler adherence as well as factors associated with non-adherence to inhaler medications is lacking. There is a need to address the burden of inhaler non-adherence and provide recommendations in order to improve the quality of asthma care at MNH and in Tanzania as whole.

Objective: To assess inhaler adherence level and determine factors for non-adherence among asthmatics at Muhimbili National Hospital pulmonology clinic.

Methodology: A cross-sectional hospital-based study was conducted at Muhimbili National Hospital. Structured Questionnaires were used to obtain patients' demographic, clinical and socioeconomic factors. Medication adherence was measured using a self-report standard Test of Adherence to Inhalers (TAI) questionnaire and asthma control was assessed using an Asthma Control Test (ACT). Data was analyzed using SPSS statistical software version 23. Summary statistics were reported as frequencies with percentages. Associations between categorical variables were analyzed using the chi-square test. Multivariate regression was applied to determine predictors of inhaler non-adherence. A $P < 0.05$ value was considered as statistically significant.

Results: A total of 385 asthma patients were enrolled in the study. 179 (46.5%) were male and 206 (53.5%) were female. A large proportion of participants (60.3%) were non-adherent to inhalational medications. Lack of health insurance, fear of medication side

effects, being too busy, having alternative medication for asthma management and incorrect inhaler technique were significantly associated with non-adherence.

Conclusion: The magnitude of inhaler non-adherence is very high. To improve adherence therapeutic decisions should be discussed with the patient taking into consideration their individual factors, socio-economic and health system factors. Interventions such as patients' assessment on their inhaler technique, regular and repeated demonstrations of inhaler use may help to improve and master the inhaler. Medication cost and insurance coverage are not easy to change; however patients should be encouraged whenever possible to enroll themselves to health insurance funds so as to cut down out of the pocket medication cost. On the other hand, the government should make sure that the inhalers are available throughout the country in affordable price so that all patients can access it.

CHAPTER ONE

1.0 INTRODUCTION

1.1. BACKGROUND

Bronchial asthma is a chronic inflammatory disorder of the airway characterized by variable and frequent symptoms of airflow obstruction, bronchial hyper responsiveness, and an underlying inflammation (1). Asthma is characterized by repeated attacks of shortness of breath and wheezing, that vary in severity and frequency from person to person (1). The condition occurs with varying severity over a period of several years and sometimes throughout the life (1). Asthma is one among the most common chronic diseases in the world. It is estimated that around three hundred million individual in the world currently have asthma (2). In Tanzania the actual burden of asthma is unknown.

According to the Global Initiative for Asthma (GINA) guidelines, the goal of asthma management is to achieve clinical control (3). The pharmacological treatment of asthma consists of reliever medications including inhaled Short Acting Beta Agonists (SABA) and Short Acting Muscarinic Antagonists (SAMA); Controller or preventer medicines such as Long Acting Beta Agonists (LABA), Long-acting Muscarinic Antagonist (LAMA) and inhaled corticosteroids (ICS); and the adds-on therapy consisting of oral corticosteroids, leukotriene receptor antagonists and methyl xanthenes (3).

The most effective long-term controller medicines available are inhaled corticosteroids (4). Clinically, inhaled corticosteroids reduce the severity of asthma symptoms, improve peak flow measurements and other measures of lung function, prevent exacerbations and possibly prevent long-term lung remodeling (3,4). However, despite the availability of highly effective pharmacotherapy, non-controlled asthma is reported in up to 70–95% of patients in Western Europe and the Asian-Pacific region (5).

Adherence to a medication regimen is generally defined as the extent to which the amount of medication patients take corresponds with agreed recommendations from a health care provider (6,7). The term adherence, therefore, does not hold any explanation of the pattern and reasons of medicine taking behavior of patients, and is intended to be a non-judgmental statement of fact rather than a declaration of blame of the patient (7). Patients

with persistent asthma are recommended to use preventer medicine daily so as to keep their asthma under control (8,9).

Non-adherence with prescribed treatments is very common, in particular with long-term therapies. Typical adherence rates for prescribed medications are about 50%, and rates of non-adherence among patients with asthma range from 30% to 70% (9). Researchers suggest that a significant portion of the healthcare advice and prescriptions dispensed was wasted (10). In the USA, The annual cost to the healthcare system caused by non-adherence has been estimated at 300 billion US dollar (11).

Non-adherence to long-term therapies severely compromises the effectiveness of treatment and accounts for considerable worsening of disease, death, and increased health care cost (12). It is clear that the full benefit of the many effective medications that are available (e.g. inhaled corticosteroids [ICS] will be achieved only if patients follow prescribed treatment regimens reasonably closely (9,13). There is growing evidence to suggest that because of the alarmingly low rates; increasing the effectiveness of adherence interventions may have a far greater impact on the health of the population than any improvement in specific medical treatment (14). Without a system that addresses the determinants of adherence, advances in biomedical technology will fail to realize their potential to reduce the burden of chronic illness (15). Medication regimens for asthma management are susceptible to adherence issues because of their duration, the use of multiple medications mostly delivered as inhalation, and the periods of symptom remission (3,8,16).

Identifying the definite reasons for non-adherence is crucial in order to determine the best way to intervene and to enhance the control of asthma. Factors associated with non-adherence include; Difficulties with inhaler devices, Misunderstanding or lack of instruction, Complex regimens, Dissatisfaction with healthcare professionals, Side effects, Medication costs, Inappropriate expectations, Dislike of medication(s), Poor supervision, training or follow-up, Fears about side effects, Underestimation of disease severity, Cultural or religious issue, Forgetfulness (17,18, 19).

Studies on interventions to improve adherence to long-term therapies have shown that in asthma, educational interventions alone are insufficient to promote adherence (18). Incorporating a behavioral component (e.g. monitoring and goal setting, reinforcing medication taking with rewards, problem solving and linking medication taking with established routines) to adherence interventions is needed to increase potential efficacy (19,20).

Improved adherence to a treatment regimen for asthma in general and to inhalers in particular is recognized as an important factor in asthmatic patients' reduced morbidity, utilization of healthcare resources and mortality (20).

1.2. LITERATURE REVIEW

Non-adherence to inhaler is often a hidden problem and contributes significantly to poor outcomes in asthma management. The magnitude and factors for inhaler non-adherence are discussed here under.

1.2.1. Magnitude of inhaler non-adherence

Non-adherence to inhaled asthma therapies are multifaceted as reported in literature. A survey in rural Lagos, Nigeria found a non-adherence to inhaler to be 61% (21). An evaluation study on impact of health education on adherence found a prevalence of non-adherence of 69% (22). The global initiative for asthma reports that around 50% of asthma patients do not take their controller medication as prescribed (3). Reasons behind unintentional non-adherence in asthma care include forgetfulness, costs and misunderstandings whereas the underlying reasons for intentional non-adherence may stem from factors such as not perceiving the need for treatment, fear of side-effects, cultural issues or cost (23).

1.2.2. Socio-demographic factors

There are inconsistent findings regarding the association between socio-demographic factors with inhaler adherence. While some studies reported positive association between the two others did not found any relationship. A prospective study done in India found that patients with higher education (post-graduates and graduates) had regular adherence with the medications (22). Non-adherence was observed in those with secondary education 60%, primary education 71.4% as well as those with no formal education 100%. Educational status was therefore found to be a significant cause for the non-adherence to the therapy for asthma medications (22). Patients who received education regarding their medications were more adherent than those who had not been given education. Some studies have shown positive association of age and inhaler adherence while others showed no association and even a negative association (24). A study done in rural England to measure adherence with asthma medication revealed that, patients over 50 years of age were more adherent with use of their inhalers than the younger participants (25). In contrary one study showed that, non-adherence is common in older patients and this was attributed to some changes that with age such as memory difficulties which predispose them to forget to take their medication (26). In addition elderly are often receiving

treatment for other chronic health conditions; this polypharmacy is well-known reason for medication non-adherence. Several studies have reported that non-adherence is more common amongst females (20).

1.2.3. Individual factors

Individual factors have been reported to affect adherence to inhalers. Survey done in over 5,000 adult asthma patients in California showed that more than 50% of the participant did not take their daily asthma inhalers as prescribed by the health care provider (27). Negative beliefs and attitudes on inhaler, being diagnosed with asthma for a longer period of time, and being younger were the major factors associated with non-adherence (27). Knowledge on asthma was shown to increase adherence rates with the asthma treatment regimen.

A study titled "Factors Affecting non-adherence in Bronchial Asthma and Impact of Health Education "showed that patients who are regular to inhaler therapy had greater understanding about their illness and the options for managing the illness (28). They additionally had larger confidence that current management would keep their illness in restraint. However, management of illness was an ambiguity for patients with non-adherence, and they had greater faith in the safety of natural medication (28).

The non-adherent groups were found to have low satisfaction and faith in the treating physicians and they believed their doctors had limited management options to give them (29). It has been observed that patients who accept their medication regimen fully as prescribed by their doctors are likely to assume a passive role in managing their illness and hand over control to the doctor. Adherent patients were less likely to be confused about their medications, which might have been the result of their greater medication knowledge (29). Moreover it has been shown that patients who are non-adherent to inhaler prefer alternative medicines in an attempt to improve their asthma symptoms (30,31). The reasons for opting an alternative medicine over conventional therapies is lack of belief in their effects or due to their prohibitive cost (32).

1.2.4. Socioeconomic-factors

It has been reported that patients from low-income, ethnic-minority groups (primarily African American) in developed countries may have lower rates of adherence to asthma therapy (33). An observational cross-sectional study done in Hungary showed that patients

who use inhalers are at increased risk of cost related non-adherence (34). Even after adjustment for factors such as income level, prescription drug coverage, and level of physical function, there was strong association between costs related non-adherence and inhaler use in the setting of chronic pulmonary diseases (34). Previous research showed that out-of-pocket costs are a major factor in medication non-adherence (26,32). A meta-analysis looking at factors associated with adherence showed a positive correlation between level of adherence and measures of income, but not with socioeconomic status (36).

Good adherence is linked with reductions in healthcare utilization in patients with asthma. One British study showed that patients who experienced an asthma attack incurred healthcare costs 3.5 times greater (costs per patient over a 1-year period) than those who did not (36). Exacerbations are thought to be responsible for 35 to 45% of all healthcare costs associated with the disease. In support of this, a retrospective study showed that higher adherence rates are correlated with reduced urgent care usage (annual number of inpatient days, inpatient visits and emergency room visits) in patients with asthma (28).

Costs related with general healthcare and lost productivity tend to be higher in patients with asthma who are non-adherent to treatment as opposed to those who are adherent. A large retrospective observational study showed that savings generated by reductions in high-cost events did not offset the increased drug costs for more adherent patients with asthma, with the exception of high-risk patients with more severe asthma (37). These results support the suggestion that the cost benefit of improved adherence may be more marked in patients with more severe forms of respiratory disease. In addition, it is possible that significant cost savings are not seen early in the disease process (as exacerbations are more mild and thus less costly to treat), but may be found as the disease progresses, with more severe exacerbations requiring more expensive treatments as a consequence, to account for this effect, economic analyses of treatments that potentially slow disease progression should be designed to capture an appropriate time period (37).

1.2.5. Health care factors

Poor inhaler technique and inadequate inhaler instruction contribute to suboptimal asthma control (38). Study done to assess inhaler technique revealed that patients who are non-adherent to their asthma medications are at a greater risk of not maintaining correct inhaler technique (36,37). Poor inhaler technique consequently results in inadequate drug delivery to the airways and hence poor disease control. This further worsens the adherence to medication. Health care providers are responsible for training patients to use an inhaler and provide information to improve adherence. However it has been shown that, poor inhalation technique is not only common among patients but also to healthcare providers which may predispose patients from receiving incorrect training and advice (40). Additionally, few follow up visits; infrequent checking of inhaler use technique may lead to inadequate mastering of inhaler use and hence non-adherence (41).

1.2.6. Association between adherence and asthma control

The association between adherence to inhaled asthma therapy and clinical effect varies in the literature (39,40). Commonly, good adherence is associated with better symptom control in patients with asthma. However, some studies have shown no association between adherence and asthma control, while conflicting associations have also been noted between the two (37,40,41). Several factors may be responsible for this variation, including population bias and differences in adherence assessment and reporting methods; however, there is general consensus that improved adherence to asthma therapy improves clinical outcomes. Overall, studies indicate that improved adherence leads to improvements in lung function in patients (44). A population-based cohort analysis demonstrated that good adherence is associated with reduced exacerbation rates in patients with Asthma. Furthermore the asthma-related death rate decreased by 21% with each additional canister of ICS used by a patient in the previous year (45).

Quality of life is also reported to increase with adherence. Overall, good adherence is associated with improvements in health-related quality of life (generally through reduced exacerbations and improved symptoms) in patients with asthma (45).

1.3. PROBLEM STATEMENT

Inhalers are the main stay in treatment of asthma. However non-adherence to these therapies is common among patients with asthma with rate ranging from 30% to 70% (9). Non-adherence to inhalers is a global burden but more critical in low and middle income countries. Non-adherence to inhaled therapies for asthma is associated with poor symptom control, higher health care utilization and healthcare costs, and reductions in health related quality of life (13). Studies have shown that several factors are associated with non-adherence include; Difficulties with inhaler devices, Misunderstanding or lack of instruction, Complex regimens, Dissatisfaction with healthcare professionals, Side effects, Medication costs, Inappropriate expectations, Dislike of medication(s), Poor supervision, training or follow-up, Fears about side effects, Underestimation of disease severity, Cultural or religious issue and Forgetfulness (17,18). In Tanzania, prevalence of inhaler adherence as well as factors associated with non-adherence to inhaler medications is lacking. There is a need to address the burden of inhaler non-adherence and provide recommendations in order to improve the quality of asthma care at MNH and in Tanzania as whole.

1.4. RATIONALE

Improving adherence to inhalers probably is the most effective method in which health-care providers can reduce the burden of uncontrolled asthma. Knowledge of the reasons for non-adherence is required to enable putting in place measures to improve adherence.

To the best of my knowledge, this is the first published study in Tanzania and one of the few in Sub Saharan Africa assessing inhaler adherence and determinants of non-adherence. Knowledge obtained from the study can help healthcare providers identify the magnitude of problem and thereafter take measures such as tailored education, inhaler technique retraining etc so as to optimize asthma care in MNH and Tanzania as whole.

1.5 CONCEPTUAL FRAME WORK

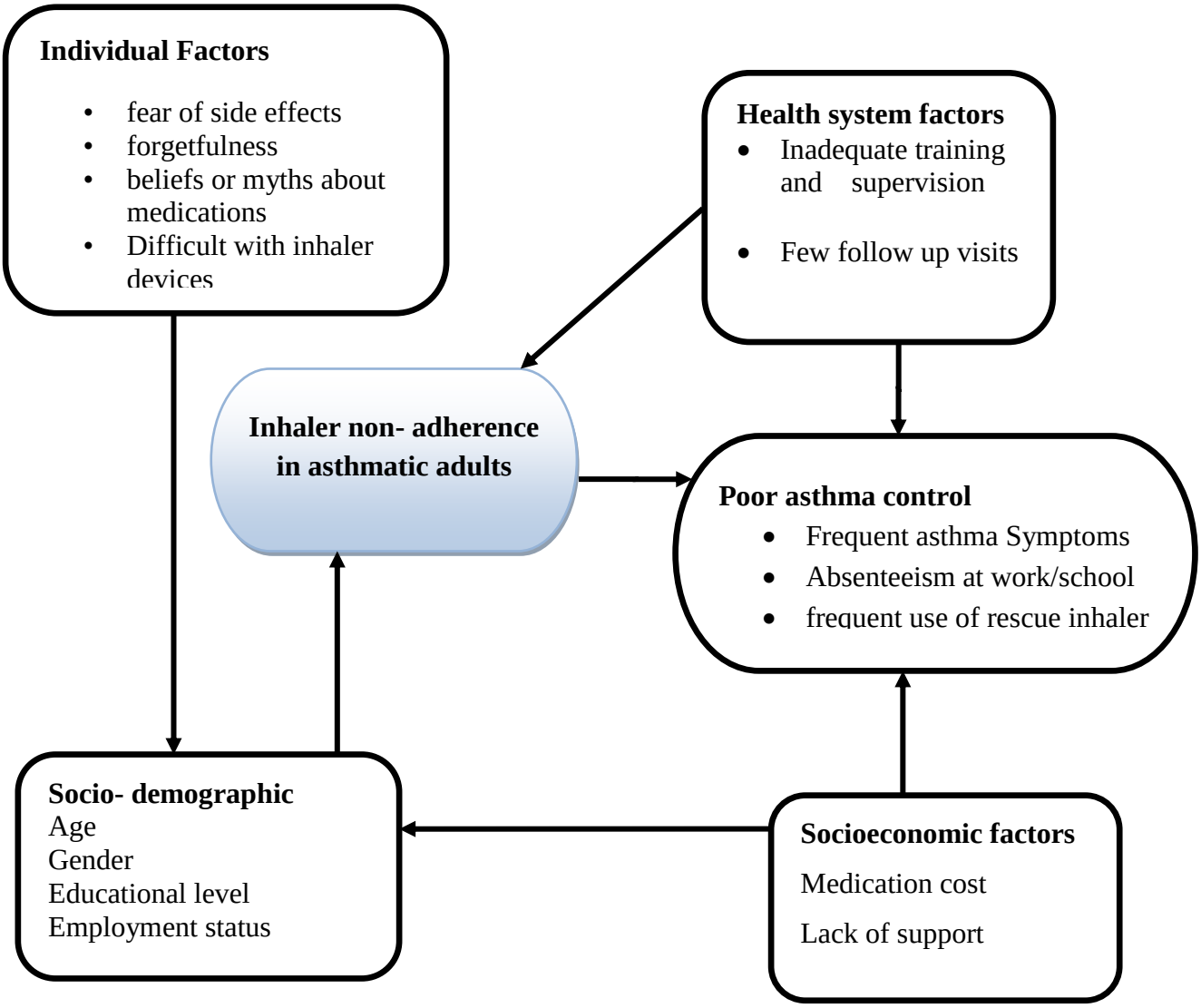


Figure 1: conceptual frame work showing factors associated with inhaler non-adherence in asthmatic adults.

1.6. RESEARCH QUESTIONS

1. What is the level of inhaler adherence among asthmatic patient at MNH?
2. What are the factors associated with inhaler non-adherence among asthmatic patients at MNH?
3. What is the level of asthma control between inhaler adherent and non-adherent patients at MNH?

1.7. OBJECTIVES

1.7.1 Broad Objective

To assess inhaler medication adherence and determine factors for non-adherence among asthmatic patients at MNH.

1.7.2 Specific Objectives

1. To determine the prevalence of inhaler adherence among asthmatic patients s at MNH.
2. To determine factors for non-adherence to inhalers among asthmatic patients at MNH.
3. To compare asthma control between inhaler adherent and non-adherent asthmatic patients at MNH.

CHAPTER TWO

2.0. METHODOLOGY

2.1 Study design

This was cross-sectional hospital-based study.

2.2 Study area

This study was conducted at pulmonology clinic of the Muhimbili National Hospital in Dar-es-salaam city. Pulmonology clinic runs a general public outpatient clinic on every Thursday and private clinic daily on the remaining days. On average about 20 asthmatic patients are attended in every Thursday while 5-10 patients are seen daily in private clinics.

2.3 Study population

All asthmatic patients attending MNH pulmonology clinic.

2.4 Inclusion criteria

- Age 18 years or older
- Diagnosed with asthma for at least past 6 months
- Being on inhalers for at least past 6 months.

2.5 Exclusion criteria

None

2.6 Study duration

The study took a period of 5months from September 2018 to January 2019.Due to the nature of clinic that mainly done in weekly basis it took that duration to attain the minimum sample size that was estimated.

2.7 Sample size

Sample size was calculated using the formula below:

$$n = \frac{Z^2 P(1-P)}{E^2}$$

Where by n - the sample size

Z -A standard normal variate at 5%type I error ($P<0.05$) it is 1.96

P-Expected proportion in population based on previous studies

E- Absolute error or precision

P=Prevalence of compliance to inhalers from a study by Askew Achaw Ayeleetal {Non adherence to inhalational medications and associated factors among patients with asthma in a referral hospital in Ethiopia, using validated tool TAI} which was 49.4%.

E= Maximum aceptable error =0.05

$$N=\frac{1.96^2 X0.50\ [1-0.50]}{0.05^2}$$

N=385, Hence Sample size is 385

2.8 Sampling method

Patients were consecutively recruited into the study.

2.9 Study procedure

All asthmatic patients attending pulmonology clinic that met inclusion criteria and were present at the clinic during data collection were invited to participate in the study. The informed consent was obtained from patients in the form of a written form (for those who could read) as well as in words for patients who could not read. Those who could not read did sign the consent form by their finger prints using a thumb.

A face-to-face interview based on structured questionnaire was used to extract patient's information. The following variables were included: age, gender, educational level, occupation, co-morbidity, smoking habit, health insurance coverage, medication used for asthma therapy, alternative medication for asthma apart from inhalers, duration of using inhaled medication; duration of asthma and if previously received inhalation instruction from healthcare workers /doctor. Other factors that were also enquired were reasons for non-adherence which included difficulty with medication re-fill, forgetfulness, fear of side effects, difficulty to use inhaler.

Medication adherence was measured using self-report by the validated standard Test of Adherence to inhalers (TAI) questionnaire. The TAI consists of two complementary questionnaires the 10-item TAI designed to identify non-adherent patients and to establish the non-adherence level, whereas the 12-item TAI questionnaire (for health care professional) was designed to guide clinically the non-adherence patterns. In this study the 10-item TAI was used. The 10-item TAI questionnaire includes (patient domain) self-

administered and scored from 1 to 5 (1 = worst possible score; 5 = best possible score). The total score for the 10-item questionnaire ranges from 10–50. Adherence is rated as good (score: 50), intermediate (score: 46–49), or poor (score: <45).

Next, the patients were required to demonstrate how they normally use their inhaler using pMDI devices containing placebo, against standardized inhaler checklists. The steps in the checklist were derived from previously published inhaler checklist and manufactures recommendation and it has eleven steps. Each correctly performed step was given a value of one, whereas, non performed or incorrectly performed step was given a value of zero. The patient's technique was judged to be good if all the steps on the checklist for correct inhaler use are performed accurately and poor if any of the required steps are missed out or performed inaccurately.

Lastly, asthma control was assessed using a standardized asthma control test (ACT) which has 5 interview based questions. The scores range from 5-25. Patients who scored >20were classified as well controlled while those who scored 19 and less were regarded as having poorly controlled asthma.

2.10 Data analysis

The questionnaires and checklists were reviewed for their clarity and appropriate coding prior to data entry. Data was analyzed using the SPSS statistical software version 23.

Summary statistics were reported as means with standard deviation or medians with inter-quartile range for continuous data, and frequencies with percentages for categorical data. Association between predictive variables (socio-demographic and clinical data of patients) and dependent variables (non -adherence) using binary logistic regression was performed to identify factors associated with inhaler non-adherence. Variable with *p* value <0.20 was included in the multivariate model and *P*-value less than 0.05 was considered statistically significant.

CHAPTER THREE

3.0. RESULTS

3.1. Socio- demographic and clinical characteristics of study participants

A total of 385 patients were enrolled into the study. Majority of the study participants were female (53.5%). More than half (55.3%) reported to be married. Majority of patients (53.0%) had secondary education. Nearly a half (49.1%) were self employed. Higher proportion of participants (93.5%) were non- smoker. More than half of respondents (53.8%) had healthy insurance and 33.2% had co-morbid conditions (Table 1).

Table 1: socio-demographic and clinical characteristics of Asthmatic patients attending MNH Pulmonology clinic (N=385).

Character	Frequency (n)	Percent (%)
Age (years)		
18-29	138	35.8
30-39	80	20.8
40-49	72	18.7
50-59	59	15.3
≥60	36	9.4
Sex		
Male	179	46.5
Female	206	53.5
Marital status		
Single	131	34.0
Married	213	55.3
Divorced/separated	19	5.0
Widowed	22	5.7
Education level		
No formal education	6	1.5
Primary school education	143	37.6
Secondary school education	204	53.0
College/ University education	32	8.3
Occupation		
Unemployed	84	21.8
Self employed	189	49.1
Employed	66	17.1
Student	46	11.9
Smoking habit		
Former smoker	24	6.2
Current smoker	1	3.0
Never smoke	360	93.5
Possession of a health insurance		
Yes	207	53.8
No	178	46.2
Having co morbidity		
Yes	128	33.2

No	257	66.8
Duration of asthma		
≤5years	79	20.5
>5years	306	79.5
Duration of inhaler use		
≤2 years	171	44.4
>2 years	214	55.6

3.2. Adherence level among study participants at MNH

Figure 2 shows adherence to inhalers among Asthmatic patients attending MNH Pulmonology clinic. The level of adherence to inhalers among the participants was assessed using 10- items TAI tool. Mean adherence score was found to be 44.16 (SD=4.5), the minimum score was 19 and Maximum score 50.In this study39.7 % of the respondents were adherent to inhalers, among this; 17.9% had good adherence with TAI score of 50 and 21.8% were intermediate adherent (TAI score 46–49) while60.3% of asthmatic patients were non- adherent to inhalers (TAI score ≤ 45).

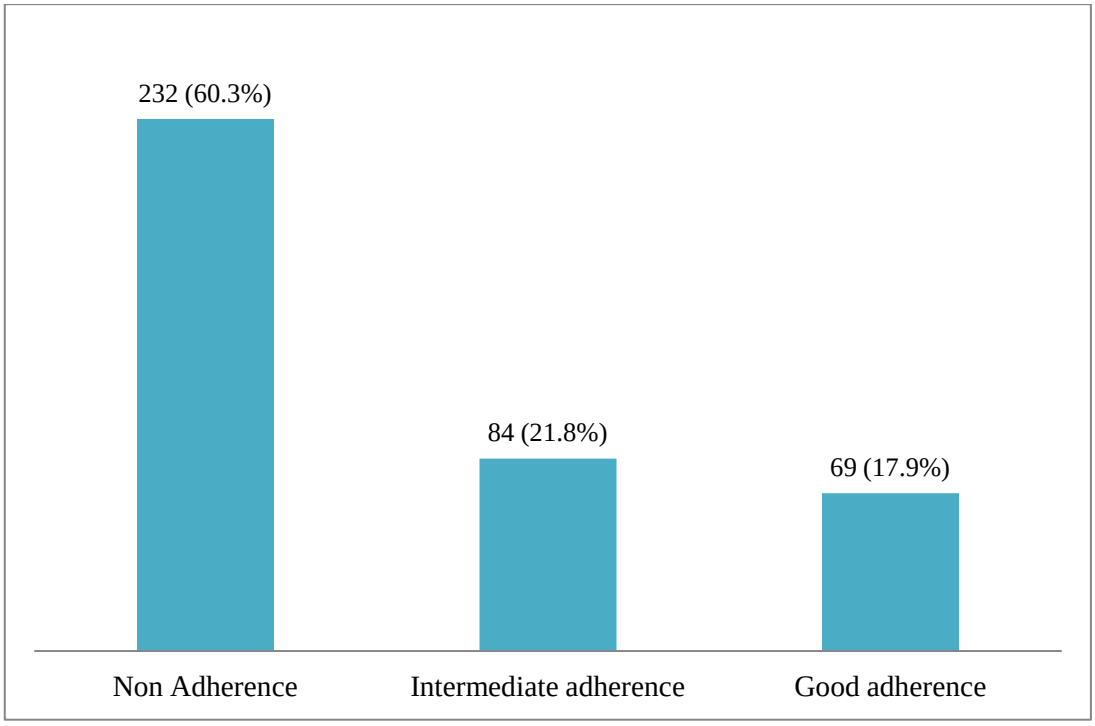


Figure 2: Adherence levels to inhalers among Asthmatic Patients Attending MNH Pulmonology Clinic (N=385).

3.3. Factors associated with inhaler non-adherence among asthma patients at MNH

Table 2 shows the factors associated with inhaler non-adherence among the study participants. Non-adherence was observed in participants with primary and lower level of education ($p = 0.02$) and unemployed ($p < 0.001$), lack of health insurance (p value < 0.001), fear of side effects (p value <0.001), being too busy (p value 0.012), forgetfulness ($p < 0.001$), having an alternative medication ($p < 0.001$) and incorrect inhaler technique. Other factors such as age ($p= 0.14$), sex ($p=0.81$), marital status ($p=0.64$), co-morbid condition (0.39), duration of asthma ($p=0.08$), duration of inhaler use, inability to buy an inhaler ($p=0.05$), unavailability of inhaler nearby (p value < 0.33) and difficult to use medication ($p = 0.165$) were not significantly associated with non-adherence.

Table 2.Factors associated with inhaler non-adherence among asthmatic patient at MNH pulmonology clinic (N=385)

Characteristics	Inhaler adherence		Total	X^2, *p*- value
	Non-adherent	Adherent		
Age				
≤40	142(63.4)	82(36.6)	224(100)	
>40	90(55.9)	71(44.1)	161(100)	2.2, ***0.14***
Sex				
Male	109(60.9)	70(39.1)	179(100)	
Female	123(59.7)	83(40.3)	206(100)	0.06, ***0.81***
Education level				
Primary or lower	100(67.6)	48(32.4)	148(100)	
Secondary or above	132(55.9)	104(44.1)	236(100)	5.15**,** ***0.02***
Marital status				
Single/ever married	112(65.1)	60(34.9)	172(100)	
Married	120(56.3)	93(43.7)	213(100)	0.22, ***0.64***
Occupation				
Unemployed	207(64.9)	112(35.1)	319(100)	
Employed	25(37.9)	41(62.1)	66(100)	16.66**,<*** ***0.001***
Co morbid conditions				
Yes	81(63.3)	47(36.7)	128(100)	
No	151(58.8)	106(41.2)	257(100)	0.73 **,0.39**
Duration of asthma				
≤ 5	41(51.9)	38(48.1)	79(100)	
>5	191(62.4)	115(37.6)	306(100)	2.9**, 0.08**
Duration of inhaler use				
Yes	104(60.8)	67(39.2)	171(100)	
No	128(59.8)	86(40.2)	214(100)	0.4**,** ***0.8***
Possession of health insurance				
Yes	94 (45.4)	113 (54.6)	207(100.0)	
No	138 (77.5)	40 (22.5)	178 (100.0)	41.2**, <*** ***0.001***
Inhaler finished and was not available nearby				
Yes	29 (76.3)	9 (23.7)	38 (100)	
No	203 (58.5)	144 (41.5)	347 (100)	4.5**,** ***0.33***
Can't afford to buy one				
Yes	18 (90.0)	2 (10.0)	20 (100)	
No	214 (58.6)	151(41.4)	365 (100)	7.79**,** ***0.05***
Fear of side effects				
Yes	127 (78.4)	35 (21.6)	162 (100)	
No	105 (47.1)	118 (52.9)	223 (100)	38.4**, <*** ***0.001***
Too busy				
Yes	21 (84.0)	4 (16.0)	25 (100)	
No	211 (58.6)	149 (41.4)	360 (100)	6.2**,** ***0.012***
Forgetting to take medication	76 (96.2)	3 (3.8)	79 (100)	
Yes	156 (51.0)	150 (49)	306 (100)	53.6**, <*** ***0.001***
No				

Difficult to use inhaler				
Yes	6 (85.7)	1 (14.3)	7 (100)	
No	226 (59.8)	152 (40.2)	378 (100)	1.92, ***0.165***
Use of alternative medication				
Yes	95 (95.0)	5 (5.0)	100 (100)	
No	137 (48.1)	148 (51.9)	285(100)	68.0**, <*0.001***
Inhaler use technique				
Correct use	20 (20)	100 (80)	120 (100)	
Incorrect use	207 (79.6)	53 (20.4)	260 (100)	12.5**, <*0.001***

Table 3. Univariate logistic regression on factors associated with inhaler non-adherence among asthmatic patients at MNH pulmonology clinic (N=385)

Factor	cOR	*p*- value
Age		
≤40	1	
>40	1.4(0.9-2.1)	***0.14***
Sex		
Female	1	
Male	1.0(0.6-1.4)	***0.81***
Education level		
Secondary and above	1	
Primary and lower	1.6(1.1-2.5)	***0.02***
Marital status		
Married	1	
Single/ever married	1.5(0.9-2.5)	***0.08***
Occupation		
Unemployed	1	
Employed	3(1.8-5.2)	***0.001***
Co morbid conditions		
Yes	1	
No	0.8(0.5-1.3)	***0.39***
Duration of asthma	1	
≤5	1.5(0.9-2.5)	
>5		***0.09***
Duration of inhaler use		
>2yrs	1	
≤2yrs	1.0(0.6-1.5)	***0.84***
Possession of health insurance		
Yes	1	
No	4.1 (2.6 – 6.4)	***<0.001***
Inhaler finished and was not available nearby		
No	1	
Yes	2.2 (1.1 – 4.9)	***0.037***
Can't afford to buy one		
No	1	
Yes	6.3 (1.4 – 27.7)	***0.014***
Fear of side effects		
No	1	
Yes	4.07 (2.5 – 6.4)	***<0.001***
Too busy		
No	1	
Yes	3.7 (1.2 – 11)	***0.018***
Forgetting to take medication		
No	1	
Yes	2.4 (1.4 – 7.8)	***<0.01***
Difficult to use inhaler		
No	1	
Yes	4.0 (0.4 – 33.8)	***0.199***

Use of alternative medication		
No	1	
Yes	2 (1.8 – 5.1)	***<0.01***
Inhaler technique		
Correct use	1	
Incorrect use	15.6(9.1-26.5)	***<0.001***

3.4. Factors associated with non-adherence obtained in multivariate logistic regression

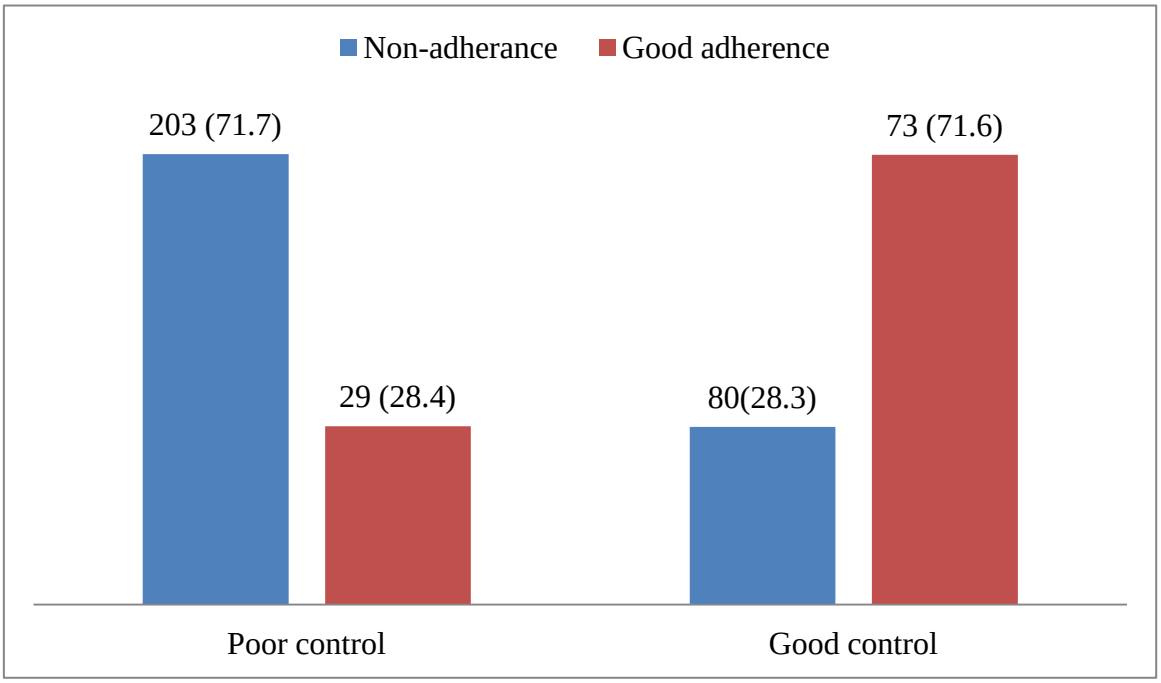
Table 4 shows factors of inhaler non-adherence by multivariate logistic regression analysis. After controlling for other factors such as age, sex, education level, duration of asthma, co-morbidity ,forgetfulness, etc, the odds of inhaler non-adherence were 4 times higher among participants with no health insurance than were those who had health insurance aOR(95%CI)= 4(2.1-7.8), p<0.001). Respondents who had fear of side effects for inhalational medications had 8.2 times increased odds of non-adherence as compared to those who had no fear, aOR(95%CI)=8.2(4.2-16), P <0.01. The odds of inhaler non-adherence were about 6 times more among respondents who were too busy than those who weren't, aOR (95%CI) = 5.9(1.5-22.4), P<0.009. Participants who had alternative medication for asthma apart from inhalational medication had 2.1 times increased odds of non-adherence as compared to those who had no other medication aOR (95%CI)=2.1(1.6-6.2), P <0.01. Patients who had incorrect inhaler technique had 11.1 times increased odds of non-adherence as compared to those with good technique aOR(95%CI)=11.1(5-30.5), P<0.001.Things like education level, occupation, unavailability of inhalers nearby once one have been finished; unaffordability, forgetfulness and difficulty use of inhalers were not predictors of inhaler non-adherence.

Table 4: Multivariate Logistic regression on factors associated with non-adherence to inhalers among Asthmatic patients attending MNH Pulmonology clinic (N=385)

Factor	aOR	P- value
Age		
≤40	1	
>40	1.3(0.5-3.3)	***0.57***
Sex		
Female	1	
Male	1.1(0.5-2.4)	***0.86***
Education level		
Secondary and above	1	
Primary and lower	0.6(0.2-1.8)	***0.39***
Marital status		
Married	1	
Single/ever married	2.1(0.9-5.0)	***0.1***
Occupation		
Employed	1	
Unemployed	0.9(0.3-3.2)	***0.91***
Duration of asthma		
≤5	1	
>5	1.9(0.7-5.7)	***0.3***
Possession of health insurance		
Yes	1	
No	4.0(2.10 –7.8)	***<0.001***
Inhaler finished and was not available nearby		
No	1	
Yes	2.6 (0.9 – 7.7)	***0.072***
Can't afford to buy one		
No	1	
Yes	1.7(0.24 –11.2)	***0.24***
Fear of side effects		
No	1	
Yes	8.2(4.2 –16)	***<0.001***
Too busy		
No	1	
Yes	3.1(0.73 –13.2)	***0.12***
Forgetting to take medication		
No	1	
Yes	2.6 (0.8 – 6.6)	***0.11***
Difficult to use inhaler		
No	1	
Yes	0.6 (0.75 – 9.5)	***0.84***
Use of alternative medication		
No	1	
Yes	2.1(1.6 – 6.2)	***<0.01***
Inhaler technique		
Correct use	1	
Incorrect use	11.1(5.1-30.4)	***<0.001***

3.6 Relationship between asthma control and inhaler non-adherence

Figure 3 shows the level of asthma control in relation to inhaler adherence. Participants who adhered to inhaler had good asthma control (71.6%) as compared to non-adherent group (28.4%), p value < 0.001.



Chi-square= 58.7, *p*<0.001)

Figure 3: Association between Asthma control and inhaler Adherence among Asthmatic patients attending MNH Pulmonology clinic (N=385)

Table 5.Univariate logistic regression on factors associated with poor asthma control among asthmatic patients at MNH (N=385)

Factor	cOR	P-value
Age		
≤40	1	
>40	0.9(0.6-1.5)	***0.75***
Sex		
Female	1	
Male	1.7(1.1-2.7)	***0.03***
Education level		
Secondary and above	1	
Primary and below	1.8(1.1-3.0)	***0.02***
Marital status		
Married	1	
Single/ever married	1.4(0.9-2.3)	***0.2***
Occupation		
Employed	1	
Unemployed	2.9(1.7-5.0)	***<0.001***
Co morbid conditions		
No	1	
Yes	1.8(1.1-3.0)	***0.03***
Duration of asthma		
5yrs or less	I	
6yrs or more	0.8(0.5-1.3)	***0.38***
Duration of inhaler use		
>2yr	1	
≤2ys	0.7(0.5-1.3)	***0.3***
Possession of health insurance		
Yes	1	
No	2.0 (1.2– 3.1)	***0.005***
Inhaler finished and was not available nearby		
No	1	
Yes	0.3 (I.2- 9.7)	***0.03***
Can't afford to buy one		
No	1	
Yes	0.1 (0.02 – I.0)	***0.06***
Fear of side effects		
No	1	
Yes	4.6 (2.2 – 9.5)	***0.001***
Too busy		
No	1	
Yes	4.4 (1.0– 19.1)	***0.05***
Forgetting to take medication		
No	1	
Yes	0.6 (0.7 – 2.1)	***0.58***
Difficult to use inhaler		
No		
Yes	0	***0***

Use of alternative medication		
No	1	
Yes	7.9(3.7 – 18.8)	***<0.001***
Inhaler technique		
Correct use	1	
Incorrect use	9.7(5.8-10.6)	***<0.001***
Adherence		
Adherent	1	
Not adherent	6.4(3.9-10.6)	***<0.001***

3.7. Factors associated with poor asthma control obtained in multivariate logistic regression

Table 5. Shows factors associated with asthma control by multivariate logistic regression analysis. After controlling for other factors such as age, sex, education level, possession of health insurance, fear of medication side effects, etc, the odds of poor asthma control were 5.3 times higher among participants with incorrect inhaler use technique as compared to those with correct technique aOR (95%CI) =5.3(2.7-10.1), p <0.001. Patients who were non-adherent to inhalers had 2.4 times odds of having poor asthma control than adherent group aOR (95%CI) =2.4(1.2-4.9), P<0.01. However male gender and unemployment had 60% reduced likelihood of having poor asthma control compare to their counterparts aOR (95%CI) = 0.4(0.3-0.8), p=0.003 and 0.4(0.2-0.9) p=0.03 respectively. Other factors like age, co-morbidity, education level, forgetfulness, being too busy, fear of medication side effects and lack of health insurance were not significantly associated with poor asthma control.

Table 6. Multivariate logistic regression on factors associated with poor asthma control among Asthmatic patients attending MNH Pulmonology clinic (N=385)

Factor	aOR	*p*- value
Age		
>40	1	
<40	1.1(0.5-2.3)	***0.78***
Sex		
Female	1	
Male	0.4(0.3-0.8)	***0.003***
Education		
Secondary and above	1	
Primary and lower	0.9(0.4-1.9)	***0.66***
Occupation		
Employed	1	
Unemployed	0.4(0.2-0.9)	***0.03***
Co morbidity		
No	1	
Yes	1.2(0.6-2.6)	***0.5***
Possession of health insurance		
Yes	1	
No	0.5 (0.3 – 1.1)	***0.07***
Inhaler finished and was not available nearby		
No	1	
Yes	0.6 (0.2 – 1.4)	***0.22***
Fear of side effects		
No	1	
Yes	1.0 (0.5 – 2.1)	***0.97***
Too busy		
No	1	
Yes	0.8 (0.3 – 1.8)	***0.44***
Use of alternative medication		
No	1	
Yes	2.1(0.9 – 5.1)	***0.1***
Inhaler technique		
Correct use	1	
Incorrect use	5.3(2.7-10.1)	***<0.001***
Adherence		
Adherent	1	
Not adherent	2.4(1.2-4.9)	***0.01***

CHAPTER FOUR

4.0. DISCUSSION

This study was conducted to assess the level of inhaler adherence and to identify factors associated with non-adherence. The study revealed that 17.9% of the asthmatic patients had good adherence to their inhaler medications and 21.8% were intermediate adherent to their medications. However significant proportion of patients 60.3% was non adherent to their inhaler medications. This prevalence of non-adherence is comparable to the findings in the literature in which non adherence level was estimated to range from 30-70% (9). A prospective study in India revealed a 61.5% prevalence of non-adherence (46). Higher prevalence of non-adherence 71.7% was also shown in a study done in Egypt (47).

Identifying factors associated with non-adherence to inhalational medications is crucial in order to determine the best way to intervene and to increase the control of asthma. In this study factors that were found to be significantly associated with inhaler non-adherence included, lack of health insurance, having primary or lower level of education, being unemployed, fear of medication side effects, being too busy, having alternative medication for asthma management besides inhalers and incorrect inhaler technique. With regards to health insurance, majority of participants who lacked health insurance were non-adherent as compared to those with health insurance. The results of previous studies showed that limited coverage for medications and out-of-pocket costs affect prescription initiation and consistent medication use (13,32,45). This cost-related non-adherence had an impact to some patients from minority populations with limited incomes. A study done in India revealed that 30.7% of patients were non adherent due to medication cost (49). This low adherence that has been observed in this study could possibly be explained by many other factors such as poverty, illiteracy, low educational achievement, unemployment, insufficient social support, transportation issue, and environmental factors that might have contributed to the non- adherence to inhalation medication. Patients with low level of education were found to be non-adhered to inhalers as compared to those with secondary and higher level of education. This observation was also reported in the previous studies in which good adherence was linked to higher level of education; secondary and university/collage (24,47). Patients with low education achievement are at higher risk of being unemployed and more likely not to have health insurance, so this may predispose

them from cost related non-adherence.

With regards to fear of medication side effects, majority of participants who reported this were non- adherent to the inhalational medications. Some of participants reported to had read on the drug leaflets that prolonged use of inhalers might cause psychosis. They also reported that it was a belief out there in the community that inhalers are for people with very severe disease; its use is life long as an attempt to stop the inhalers may result into severe attack of asthma. They also believed that after starting inhalers no any other medication will work. These beliefs and undue fears were observed in the previous studies where non- adherence was linked to misplaced concerns about potential adverse effects than the actual experience of side effect (39,48). A comparison study to evaluate patients reported side effects with the clinician's estimates found that patients were over reporting the side effects compared to the actual prevalence reported by clinician (52). A meta-analysis to assess adherence –related beliefs showed that, adherence to medication was influenced by the patients' beliefs about the prescribed medication, how they judge their personal need for it relative to their concerns about the potential adverse consequences of taking it (36). This non-adherence seen here may be due to lack of knowledge about inhalers and community perceptions and beliefs towards inhalers safeness as compared to other treatment options (53).

Furthermore, the use of alternative medication for asthma management was found to be associated with inhaler non- adherence. The preferred alternative drugs mentioned were oral aminophylline, salbutamol and herbal medications. Most reported reasons for use of alternative medications were lack of symptoms relief, cost of inhaler and unavailability of inhaler medication in some parties of the country. Several studies have shown positive correlation between the use of alternative medications for asthma management and non-adherence (34,51, 52). For instance, the use of alternative medication was found in patients with severe disease or those with poorly controlled asthma (55). The use of alternative medication for asthma was also found to be common in certain racial and ethnic groups such as African Americans and Latinos (53,54). This preference to alternative medication could be explained by lack of knowledge on asthma and its management as well as belief on oral medication that they are safer than inhalational medications.

On the other hand, participants who reported to be too busy with their daily activities were non adherent to inhaler medication as compared to those who weren't busy. In this study nearly a half (49.1%) of participants reported to be self employed. With their busy schedule on daily basis in order to generate income, they turned non-adherent. Previous studies have shown that busy lives coupled with negative perceptions of medication and inhaler taking were main reasons for forgetfulness and hence non adherence (24,45, 54).

Additionally, incorrect inhaler technique was associated with non-adherence. In the present study among the non-adherent group (71.6%) demonstrated incorrect inhaler technique. Some studies have reported the correlation between incorrect inhaler technique with poor asthma control while other studies did not find a relationship (42, 55). Between 72–83% of people with asthma are not using their inhalers correctly and up to 90% of patients are not taking them regularly as prescribed. Incorrect inhaler technique leads to poor drug delivery to the lungs and hence poor asthma symptoms control which may predispose a patient to non-adherence (12,35). Some of factors that reported to be associated with incorrect inhaler technique were lack of education on proper use of inhaler, few follow up visits, unemployment and lack of formal education (43,56). Incorrect inhaler technique seen in these patients can be due to lack of regular training on inhaler use and infrequent monitoring of its use by health care provider. In this study male gender and unemployment was found to be protective against poor asthma control. Both male gender and patient who are unemployment had 60% likelihood of having good asthma control as compared to their counter parts. With regard to male gander literatures has shown in childhood boys have twice the risk of developing asthma which shift to a female predominance in adulthood (59). It is suggested that hormonal changes occurring during puberty may contribute to the increased incidence in adult women (57,58). This further supported by variation in the severity and frequency of asthma symptoms throughout the menstrual cycle (61). Despite this evidence, the specific mechanisms of action for sex hormones to promote or prevent asthma remain unclear (58,60).

On the other hand unemployment was also found to be associated with good asthma control. This finding was contrary to many studies in the literature that reported unemployment being associated with poor asthma control (61,62). It has been reported that Absenteeism, low work productivity, overall work impairment and activity impairment were all common in patient with poorly controlled asthma (63). The discrepancy observed in this study can be explained as follows, may be these patients had poorly controlled asthma initially that led them to quit the job or being unemployed, they have more time to look after their illness. A study looking on employment status and changes in working career in relation to asthma found that, asthma symptoms were relieved after career changes especially among those who reported asthma to be the reason for the change (64). However further studies are needed in this aspect before conclusions are made.

4.1. LIMITATION OF STUDY

The checklist used for inhaler technique assessment varies among the researchers as well as manufacturer recommendations. Although the steps are more or less the same but they are not standardized. This could have magnified the error rates among study participants.

Due to its cross-sectional design no conclusions on causality can be drawn if non-adherence was the cause of poor asthma control or the vice versa. This requires are specific study design such as a prospective interventional study to capture on that aspect.

CHAPTER FIVE

5.0. CONCLUSION AND RECOMENDATIONS

This study has demonstrated that non- adherence to inhaler medication is very common. In this study the independent factors for non-adherence were lack of health insurance, fear of medication side effects, having alternative medication for asthma management apart from inhalers and poor inhaler technique. To improve adherence therapeutic decisions should be discussed with the patient taking into consideration their individual factors, socio-economic and health system factors. Interventions such as patients' assessment on their inhaler technique, regular and repeated demonstrations of inhaler use may help to improve and master the inhaler. Medication cost and insurance coverage are not easy to change; however patients should be encouraged whenever possible to enroll themselves to health insurance funds so as to cut down out of the pocket medication cost. On the other hand, the government should make sure that the inhaler drugs are available throughout the country in affordable price so that all patients can access it.

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7.0. APPENDICES

7.1 Appendix I: Questionnaire

ASSESSMENT OF INHALER ADHERENCE AND FACTORS ASSOCIATED WITH NON ADHERENCE AMONG ASTHMATIC PATIENTS ATTENDING PULMONOLOGY CLINIC AT MNH.

Serial No…….

1. Age in years -------
2. Sex
    1. Male
    2. Female ……..
3. Marital Status
    1. Single
    2. Married
    3. Divorced/Separated
    4. Widowed ……
4. Education level
    1. No formal education
    2. Primary school education
    3. Secondary school education
    4. College/University education ……
5. Occupation
    1. unemployed
    2. self employed
    3. Employed
    4. Student ……..
6. Smoking habit
    1. Former smoker
    2. Current smoker
    3. Never smoke ……
7. Do you have a health insurance 1. Yes 2. No
8. Do you have any other chronic diseases besides asthma? 1. Yes 2. No

    Mention them 1. HIV 2. Hypertension 3. DM 4. Renal disease 5. Others specify_____

9. How long have you had asthma? (Years)……

10. How long have you used inhaler? (Years)……

Which inhaler(s) do you use? Write the name of the drug here _____

1. SABA (Short Acting Beta Agonists) e.g Salbutamol
2. ICS (Inhaled Corticosteroids) e.g Budesonide
3. LABA (Long Acting Beta Blockers) Salmeterol/Fotererol
4. SAMA (Short acting Muscarinic antagonists) Ipatropium bromide
5. LAMA (Long acting muscarinic antagonists)Tiotropium bromide

11. Do you know the function of the medicine in your inhalers (What does it do to your lungs) Write the answer here……..……

    1. Knows
    2. Doesn't know

12. On average in the past one month, how many days in a week did you use your controller inhaler …….

    1. 1 - 2 2. 3-5 3.>5

13. Could you tell the reasons for not using inhaler as prescribed (everyday)?

    1. Finished and was not available nearby
    2. Can't afford to buy one
    3. Due to fear of side effects
    4. I was too busy
    5. I forgot
    6. Difficult to use
    7. I have alternative medication
    8. Others…….

14. Do you have other medications for asthma apart from inhaler 1. Yes 2. No

15. Please mention them……

1. Salbutamol tabs 2. Aminophylline tabs 3. Herbal medication 4. Others specify……

16. Did your doctor/ health care provider ever taught you on how to use your inhaler 1.Yes 2. No

17. If yes how many times were you taught on how to use your inhaler?.....

(a)Once (b) every each follow up visit (c) Others specify……..

7.2 Appendix II: KISWAHILI VERSION

DODOSO KUHUSU KUPIMA UZINGATIAJI WA MATUMIZI YA VIPULIZI DAWA VYA PUMU NA SABABU ZINAZOPELEKEA KUTOKUZINGATIA MATUMIZI YA VIPULIZI DAWA VYA PUMU KWA WAGONJWA WA PUMU KATIKA HOSPITALI YA TAIFA YA MUHIMBILI.

Nambari ya utambulisho…….

1. Umri wako (miaka)……..
2. Jinsia
    1. Me
    2. Ke…….

3. Hali ya ndoa

1. Sijaoa/Sijaolewa
2. Nimeoa/Nimeolewa
3. Nimeachwa/Tumeachana/tumetengana
4. Mjane……..

4. Kiwango cha elimu

1. Sijasoma
2. Elimu ya msingi
3. Elimu ya secondary
4. Elimu ya chuo/Chuo kikuu……..

5. Kazi yako

1. Sijaajiriwa
2. Nimejiajiri
3. Nimeajiriwa
4. Mwanafunzi…….

6. Tabia ya uvutaji sigara

1. Niliwahi kuvuta zamani
2. Navuta/Mvutaji
3. Sivuti/Sijawahi kuvuta……

7. Je una bima ya afya? 1. Ndiyo 2. Hapana

8. Je unamagonjwa yeyote sugu tofauti na asthma 1.Ndiyo 2.Hapana

Kama ndiyo yataje 1.VVU (Ukimwi) 2.Shinikizo la damu 3.Kisukari 4.Magonjwa ya figo5. Mengineyo ainisha…….

9. Ni kwa muda gani umekua na asthma? (miaka)……..

10. Ni kwa muda gani umetumia kipulizi dawa? (miaka)……

Ni kipulizi dawa kipi unatumia? Andika jina la dawa hiyo hapa……

1. SABA (Short Acting Beta Agonist) e.g Salbutamol
2. ICS (Inhaled Corticosteriods) e.g Budesonide
3. LABA (Long Acting Beta Agonist) e.g Salmeterol/Formeterol
4. SAMA (Short Acting Muscarinic Antagonist) e.g Ipatropium bromide
5. LAMA (Long Acting Muscarinic Antagonist) e.g Tiotropium bromide

11. Je unajua kazi ya dawa ndani ya vipulizi dawa vyako?(Inafanya kazi gani katika mapafu yako?)

Andika jibu lako hapa……

1. Najua
2. Sijui

12. Kwa wastani katika mwezi uliopita ni siku ngapi kwa wiki ulitumia kipulizi dawa chako……

1.1-2 2.3-5 3.>5

13. Je unaweza kuniambia sababu zinazopelekea kutokutumia vipulizi dawa vyako kama ulivyoelekezwa na mtoa huduma wa afya?(Kila siku)

1. Iliisha na haikupatikana maeneo ya karibu
2. Siwezi kumudu gharama za kununua
3. Kwasababu ya athari zake
4. Sikuwa na muda (Majukumu yalinibana)
5. Nilisahau
6. Ngumu kutumia
7. Nina tiba mbadala
8. Mengineyo ainisha……

14. Je unatumia dawa nyingine kwa ajili ya matibabu ya asthma tofauti na vipulizi dawa?

1. Ndiyo 2.Hapana

15. Kama ndiyo, tafadhali zitaje……..

1. Vidonge vya salbutamol 2.Vidonge vya aminophylline 3.Dawa za mitishamba 4. Mengineyo ainisha……

16. Je daktari/muhudumu wako wa afya amewahi kukufundisha jinsiya kutumia kipulizi dawa chako? 1. Ndiyo 2.Hapana

17. Kama ndiyo ni mara ngapi unafundishwa jinsi ya kutumia kipulizi dawa chako? 1. Mara moja 2.Kila ninapoenda kliniki 3.Nyinginezo ainisha……..

I. INHALER USE CHECKLIST

STEP	CORRECT	INCORRECT	COMMENTS
Remove cap			
Hold inhaler upright and shake well			
Breathe out gently, away from the inhaler			
Put mouthpiece between teeth without biting and close lips to form good seal			
Start to breathe in slowly through mouth and, at the same time, press down firmly on canister			
Continue to breathe in slowly and deeply			
Hold breath for about 5 seconds or as long as comfortable			
While holding breath, remove inhaler from mouth			
Breathe out gently, away from the inhaler			
If an extra dose is needed, repeat steps 2 to 10			
Replace cap			

II. TEST OF THE ADHERENCE TO INHALERS (TAI) QUESTIONNAIRE

Patient domain: **questions, responses (scores)** **Score**

1. During the last 7 days, how many times did you forget to take your usual inhalers?

All (1) More than half (2) Approximately a half (3) Less than half (4) None (5) 1 to 5

2. Do you forget to take inhalers?

Always (1) Mostly (2) Sometimes (3) Rarely (4) Never (5) 1 to 5

3. When you feel good about your illness, do you stop taking your inhalers?

Always (1) Mostly (2) Sometimes (3) Rarely (4) Never (5) 1 to5

4. When you are on vacation or weekend, do you stop taking your inhalers?

Always (1) Mostly (2) Sometimes (3) Rarely (4) Never (5) 1 to 5

5. When you are nervous or sad, do you stop taking your inhalers?

Always (1) Mostly (2) Sometimes (3) Rarely (4) Never (5) 1 to 5

6. Do you stop taking your inhalers because of fear of side effects?

Always (1) Mostly (2) Sometimes (3) Rarely (4) Never (5) 1 to 5

7. Do you stop taking your inhalers because of considering they are useless to treat your condition?

Always (1) Mostly (2) Sometimes (3) Rarely (4) Never (5) 1 to 5

8. Do you take fewer inhalations than those prescribed by your doctor?

Always (1) Mostly (2) Sometimes (3) Rarely (4) Never (5) 1 to 5

9. Do you stop taking your inhalers because you believe they interfere with your everyday or working life?

Always (1) Mostly (2) Sometimes (3) Rarely (4) Never (5) 1 to 5

10. Do you stop taking your inhalers because you have difficulties to pay them?

Always (1) Mostly (2) Sometimes (3) Rarely (4) Never (5) 1 to 5

III. ASTHMA CONTROL TEST

During the **past 4 weeks**, how often did your asthma prevent you from getting as much done at work, school or home?

1	All of the time	**2**	Most of the time	**3**	Some of the time	**4**	A little of the time	**5**	None of the time

Score _____

2. During the **past 4 weeks**, how often have you had wheeze or shortness of breath?

1	More than once a day	**2**	Once a day	**3**	3-6 times a week	**4**	1-2 times a week	**5**	Not at all

Score _____

3. During the **past 4 weeks**, how often did your asthma symptoms (wheezing, coughing, and shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning?

1	4 or more times a week	**2**	2-3 nights a week	**3**	Once a week	**4**	Once or twice	**5**	Not at all

Score _____

4. During the **past 4 weeks**, how often have you used your rescue inhaler (such as Salbutamol)?

1	3 or more times a day	**2**	1-2 times a day	**3**	3-4 times a day	**4**	Once a week or less	**5**	Not at all

Score _____

5. How would you rate your asthma control during the **past 4 weeks**?

1	Not controlled	**2**	Poorly controlled	**3**	Somewhat controlled	**4**	Well controlled	**5**	Completely controlled

Score _____

7.3 Appendix IIIA: Consent form –English version

CONSENT TO PARTICIPATE IN THE STUDY TITLED "ASSESSMENT OF INHALER ADHERENCE AND FACTORS ASSOCIATED WITH NON ADHERENCE AMONG ASTHMATIC PATIENT AT MNH PULMONOLOGY CLINIC**.**

Greetings: I am Dr. Amina Omary, a postgraduate student doing a research on inhaler adherence and factors associated with non-adherence among asthmatic patient at MNH pulmonology clinic.

Purpose of the study: To determine the inhaler adherence level and factors associated with non-adherence among asthmatic patients in order to propose appropriate measures.

The participants of the study: Asthma patients aged 18 years or older attending pulmonology clinic at MNH who agreed to participate in the study will be interviewed on social-demographic information, adherence to their inhalers and reasons for non-adherence to their inhaler. Participants will also require to demonstrate how they normally use their inhaler. Participants who are non-adherent to inhaler will be educated on the importance of inhaler adherence.

Confidentiality: Patient information will be entered into computer with only an identification number to maintain the confidentiality.

Right to participate and withdrawal: Participation in this study is completely voluntary and refusal to participate or
Withdrawal will not change your care in this hospital in any way.

For more information and clarification

Feel free to contact me, the investigator, Dr. Amina Omary,
Mobile phone 0687 752 260
Dr. Grace Shayo, supervisor of the study, Senior lecturer MUHAS,
P.O. Box 65000, Dar es salaam, Tanzania. Mobile phone 0754 564 924.
Prof. F. Mugusi, assistant supervisor, senior lecturer, mobile phone 0784 613 354

If you have any questions concerning your right as a participant, you may contact

Tel: +255 (0) 22 2152489/0302-6

I' …… have read the consent/told about the form and agree to participate in this study.

Signature participant……...

Signature of investigator……

Date of signed consent……

7.4 Appendix III B: Consent form – Swahili Version

FOMU YA HIARI YA KUSHIRIKI KATIKA UTAFITI KUHUSU UZINGATIAJI WA MATUMIZI YA VIPULIZI DAWA VYA PUMU NA SABABU ZINAZOPELEKEA KUTOKUZINGATIA MATUMIZI YA VIPULIZI DAWA VYA PUMU KWA WAGONJWA WA PUMU KATIKA HOSPITALI YA TAIFA MUHIMBILI.

Habari yako/Shikamoo!

Jina langu ni Dkt. Amina Omary. Ni mwanafunzi wa udaktari bingwa wa magonjwa ya ndani katika chuo kikuu cha MUHAS. Ninafanya utafiti kuhusu "Uzingatiaji wa matumizi ya vipulizi dawa vya pumu na sababu zinazopelekea kuto kuzingatia matumizi ya vipulizi dawa_vya pumu kwa wagonjwa wa pumu katika hospitali ya Taifa Muhimbili."

Lengo la utafiti: Lengo la utafiti huu nikuchunguza ni kwa kiasi gani wagonjwa wa pumu wanazingatia matumizi ya vipulizi dawa vya pumu na sababu zinazopelekea kuto kuzingatia matumizi ya vipulizi dawa vya pumu, ili kutoa mapendekezo stahiki kuhusu suala hili.

Washiriki wa utafiti huu ni: Wagonjwa wa pumu wenye umri wa miaka 18 na kuendelea, wanaotibiwa katika kliniki ya maradhi ya kifua Muhimbili. Kutafanyika usaili kupata taarifa za washiriki kuhusu masuala ya kijamii, uzingatiaji wa matumizi ya vipulizi dawa za pumu na sababu zinazopelekea kuto kuzingatia matumizi ya vipulizi dawa vya pumu. Washiriki pia wataombwa kuonyesha namna wanavyotumia kipulizi dawa kwa kawaida.

Washiriki watakaopatikana hawana uzingatiaji mzuri wataelimishwa umuhimu wa kuzingatia matumizi ya vipulizi dawa vya pumu.

Usiri: Taarifa binafsi za washiriki wa utafiti huu hazitatolewa kwa mtu yeyote mwingine, zaidi ya mgonjwa mwenyewe na mtafiti, pia namba za utambulisho zitatumika badala ya jina ili kutunza usiri.

Ushiriki wa hiari na uhuru wa kujitoa: Utafiti huu unafanyika kwa hiari. Utaombwa kusaini kama utakubali kushiriki. Kukataa kushiriki hakutaathiri matibabu yako kwa namna yoyote ile.

Kwa maelezo zaidi wasiliana na:

Dkt Amina Omary. Simu nambari 0687 752 260, Mtafiti mkuu.

Dkt. Grace Shayo, Mhadhiri na msimamizi wa utafiti, MUHAS

Simu nambari 0754 564 924

Prof.F.Mugusi,Mhadhiri na msimamizi msaidizi wa utafiti

Simu nambari 0784 613 354

Kwa ufafanuzi zaidi kuhusu haki zako kama mshiriki wa utafiti, wasiliana na:-

Dr.Bruno Sunguya,

Mkurugenzi wa Utafiti

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Mimi …… nimesoma/ nimeelezewa yaliyomo kwenye fomu hii na nimeyaelewa. Nimekubali kushiriki katika utafiti huu.

Saini ya mshiriki……

Saini ya mtafiti……

Tarehe:.....