

Effect of Intervention on Metered Dose Inhaler Use Technique and its Association with Asthma Control among Adult Asthmatic Patients attending Outpatient Clinic, Jimma University Medical Center, Jimma, Southwest Ethiopia: Interventional Study



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Abstract

Background: Asthma is heterogeneous disease which is characterized by chronic airway inflammation. It is a common chronic respiratory disease affecting 1- 18% of population in different countries. It can be treated mainly with inhaled medications in several forms, including the pressurized metered dose inhaler (MDI). MDI use can unfortunately be difficult for patients to use and even with repeated demonstration and assessment some patients will still find co-ordination of the whole technique challenging, failing to master it despite repeated demonstration.

Objective: To evaluate the effect of intervention on MDI use technique and its association with treatment outcome among adult asthmatic patients who attend respiratory clinic in Jimma university medical center (JUMC), Southwest Ethiopia.

Method: Interventional study was conducted at JUMC, Jimma, Ethiopia from March22/2018-July22/2018. Structured questionnaire was used to assess patient demography; baseline inhalation technique was assessed using a standard check-list of recommended steps National Institute of Health (NIH) guidelines, baseline adherence using asthma inhalation test and baseline asthma control status was assessed by GINA, 2017 guideline. At visit 2 treatment outcome and inhalation technique were reevaluated. Independent predictors of outcome identified and strength of association between dependent and independent variables determined by using binary and ordinal logistic regression analysis and statistical significance was considered at $p < 0.05$. McNemar and willcoxon rank test were used to compare pre- post result of inhalation technique and asthma control respectively.

Result: One hundred forty patients were included in the analysis. The most frequent critical step mistake in both pre and post intervention was short duration of the inhalation 87.1%. At the first visit, 121(86.4%, 95%CI: 81-92) patients were inefficient and it was dropped to 103(73.57%, 95%CI: 66-81) after intervention. The mean critical error was 2.69 in pre intervention and dropped to 2.09 after intervention. Before intervention, 18(12.9%) patients were controlled and increased to 26(18.4%) after intervention.

Conclusion and Recommendations: Most of study participants were inefficient to use inhalation technique before intervention. After intervention, the number of patients who were efficient is increased as compared to pre intervention and found to be highly significant on inhalation technique. Asthma controlled status were significantly improved after intervention as compared to base line assessment. Inhalation technique is a significant independent predictor for asthma control status. Patient should ask health care professionals how to take medication and they should bring their device to receive demonstration during visit. Health professionals should reevaluate the patient during their Hospital visit and encourage to bring their device to give demonstration.

Key-words: Asthma, Asthma control, intervention, inhalational technique, JUMC.

Abstract	IV
List of tables	VII
List of figures	VIII
List of acronyms	IX
1. Introduction.....	1
1.1 Background.....	1
1.2 Statement of the problem.....	3
1.3 Significance of the study.....	5
1.4 Literature review.....	6
1.4.1 Magnitude of inappropriate use of inhaler techniques	6
1.4.2 Predictors of inappropriate MDI utilization	9
1.4.3 Association between inhalation technique and asthma control.....	12
1.5 Conceptual frame work	13
2. Objectives.....	14
2.1 General objective.....	14
2.2 Specific objectives	14
3. Method and participants.....	15
3.1 Study area and period	15
3.2 Study design.....	15
3.3 Population.....	15
3.3.1 Source population.....	15
3.3.2 Study population	15
3.3.3 Sample population.....	15
3.3.4 Inclusion and exclusion criteria.....	16
3.4 Sample size and sampling technique	17
3.5 Variables.....	18
3.5.1 Dependent variables	18
3.5.2 Independent variables.....	18

3.6 Data collection instrument and procedure	18
3.7 Data quality assurance	19
3.8 Data analysis.....	19
3.9 Ethical considerations.....	20
3.10 Dissemination plan	20
3.11 Operational definitions	21
4. Result.....	22
4.1 Sources of patient education about inhalation technique.....	24
4.2 Prevalence of inappropriate inhalation techniques pre and post intervention.....	25
4.3 Factors associated with incorrect use of inhaler device.....	29
4.4 Association between asthma control and correct use of inhaler devices.....	32
5. Discussion.....	38
5.1. Strength and limitation.....	42
6. Conclusion.....	43
8. Recommendation.....	44
Reference.....	45
Annexes:.....	49
Patient consent form.....	49
Data collection tool.....	50

List of tables

Table 1: Demographic details and clinical characteristics of the study subjects, respiratory clinic, JUMC, Ethiopia, 2018	23
Table 2: Participants who can perform inhalation technique correctly pre and post intervention, respiratory clinic, JUMC, Ethiopia, 2018	28
Table 3: Predictors for of inhalation technique among asthmatic patients, respiratory cclinic, JUMC, Ethiopia, 2018	30
Table 4: Frequency of rescue medication use, night time symptoms, day time symptoms before and after intervention, respiratory clinic, JUMC, Ethiopia, 2018	34
Table: 5 Predictors of poorly controlled asthma.....	36

List of figures

Fig. 1: Conceptual frame work for factors associated with inhalation technique and treatment outcome.....	13
Fig. 2: Summary of sampling procedure.....	17
Fig. 3: Sources of patient education about their inhalation technique, respiratory clinic, JUMC, Ethiopia, 2018.....	24
Fig. 4: Number of steps done by the patient pre and post intervention, respiratory clinic, JUMC, Ethiopia, 2018.....	26
Fig. 5 Number of critical steps missed in pre and post intervention, respiratory clinic, JUMC, Ethiopia, 2018.....	27
Fig.6: Asthma control status before and after intervention in respiratory clinic, JUMC, Ethiopia, 2018	32
Fig.7: The relationship between inhalation technique and asthma control status, respiratory clinic, JUMC, Ethiopia, 2018.....	32
Fig.8: The relationship between asthma control status and number of critical steps missed, respiratory clinic, JUMC, Ethiopia, 2018	33
Fig.9: The relationship between number of steps done and asthma control status, respiratory clinic, JUMC, Ethiopia, 2018	35

List of acronyms

ADR: Adverse Drug Reaction

ER: Emergency Room

FEV1: Forced Expiratory Volume in 1 second

ICU: Intensive Care Unit

ILD: Interstitial Lung Disease

JUMC: Jimma University Medical Center

GINA: Global Initiative National Asthma

GOLD: Global Initiative for Chronic Obstructive Lung Disease

MDI: Metered dose Inhalation

NIH: National Institute of Health

OPD: Outpatient Department

SABA: Short Acting Beta Agonist

TAI: Test of Adherence Inhalation

UAE: United Arab Emirat

USA: United States of Ameri

1. Introduction

1.1 Back ground

Asthma is heterogeneous disease which is characterized by chronic airway inflammation. It is defined by history of patient respiratory symptom such as wheeze, cough, and shortness of breath and chest tightness. Intensity and frequency of symptoms can vary from time to time and together with variable air flow limitation. It is a common chronic respiratory disease affecting 1- 18% of population in different countries(1).

An increasing number of risk factors have been linked to the development of asthma, particularly found in developing countries. These include indoor like biomass, and outdoor pollution, occupational exposures, early life factors such as intra-uterine growth retardation, history of pulmonary tuberculosis, poor nutrition. Most Nepalese families were found to use unprocessed biomass fuel (such as grass, wood) for cooking and heating and hence respiratory symptoms have been associated with the use of smoky fuels in Nepal and in other countries(2).

Prevention of disease progression, improvement of symptoms, exercise tolerance and decrease in exacerbations and mortality are the goals of management for asthma. The medications normally used in asthma are the bronchodilators and anti-inflammatory agents. Systemic administrations of these agents produce considerable side-effects. Hence, to overcome this problem as well as have a quicker onset of action and for better efficacy, inhaled medications are preferred (3).

Good inhaler technique is vital for a drug to be effective and bearing in mind the wide range of drugs used for treatment of respiratory conditions cost of misuse can be significant. If patients are not using their inhalers correctly the need for increased dosages, systemic steroids and irregular visits to the doctor may increase. Only 79% of patients tested could use the MDI efficiently even after instruction. Patient education should play an important part in the provision of inhaler device. Technique should be assessed by direct observation after expert instruction(4).

MDI is one of the most commonly used devices in management of asthma. This can unfortunately be difficult for patients to use and even with repeated demonstration and assessment some patients will still find co-ordination of the whole technique challenging, failing to master it despite repeated training(5).

Adherence to inhaled medication in asthma may impact on clinical outcomes. Recently, Vestbo et al reported that among moderate to severe patients enrolled in the revolution of asthma health study, there was a strong association between adherence to inhaled medicine and mortality, as well as risk of hospitalization due to exacerbations. They found that the mortality of non adherent patients was more than twice that of adherent patients(6).

Study done in India, revealed that patients with poorly controlled asthma (92.6%) as compared to those with partially controlled asthma (7.4%) had a significant association with inhalation technique and are more likely to use asthma device improperly(7).

Asthma control can be assessed by individual subjective and objective measures. The subjective measures include number of daytime symptoms/week, nocturnal awakening, limitation of activity, b2-agonist use as rescue medications two or more than two times/week while lung function tests using peak flow meters or spirometer considered as the objective measure(8).

1.2 Statement of the problem

Despite effective drugs and evidence based guidelines developed, no major changes in morbidity and mortality have been found. Study done in India indicates that most asthma patients are not well controlled. One of the major reasons is found to be the inability of the patients to use their inhaler devices correctly. Incorrect inhaler technique have shown to have a direct effect on the patients in terms of disease control (higher risk of poor asthma control) and consequent potential effects on morbidity, mortality, and quality of life(9).

Previous studies in Europe have reported a high rate of inadequate inhalation technique varying from 77.5% to 89.2%. In addition, a gradual temporal decline in the correct technique of inhaler use has also been observed. This information is essential to plan a structured educational protocol while initiating patients on MDI therapy(10).

In a large cross-sectional study involving over 1,600 asthma outpatients, the finding of just one critical error in inhalation technique was associated with increased emergency room visits, hospitalization, and oral medication prescription. Poor inhaler technique has clinical consequences that have been documented for asthma patients taking inhaled corticosteroids delivered by MDIs; instability of asthma was more frequent in patients with poor inhaler technique than in those with good technique(11).

The consequences of poor inhaler technique are also financial, with one review estimating that about a quarter of all expenditure on inhalers is wasted owing to poor inhaler technique. The total cost burden associated with poor inhalation technique more than doubled when productivity losses were taken into account. These indirect costs were highest in the United Kingdom(UK)(€390 million), followed by Sweden (€194 million) and Spain (€93 million). Inclusion of indirect costs increased the total per-patient costs of poor inhalation technique to €71 in Spain, €466 in Sweden and €506 in the UK(12).

In addition to the social impact of asthma, there are substantial economic costs. These include costs related to health services as well as loss of school and work time, which leads to poor scholastic performance and decreased productivity(13).

In order to improve the use of inhaler devices, inhaler technique assessment and training needs to be delivered at the initiation of the therapy with new inhaler device and also needs to be repeated throughout the period that the patient received the inhaled therapy(14).

Studies from various countries have demonstrated that poor knowledge among the health care professionals like doctors, nurses, pharmacists can lead to incomplete and improper information to the patients. Studies have recommended regular training even for the health care professionals in order to improve their knowledge about correct use of inhaler and its importance in the management of diseases(15).

Correct use of the inhalation devices will maximize the beneficial effects of the inhaled therapy as well as minimize potential adverse effects. Therefore, continuous assessment and appropriate intervention of inhalation technique should be routinely done in every encounter with the asthmatic patients, especially out-patients(16).

Inhaler therapy is a first-line controller therapy for asthma self-management. Despite its effectiveness, misuse of inhaled medications is common, which results in compromised treatment outcomes and excess health care costs. Even though treatment outcome of asthma were assessed and majority of patients were not controlled. But inhalation technique of the patient did not assess and gave appropriate feedback in Ethiopia.

Previous findings were not addressed the contribution of inhalation technique for treatment outcome (patient inhalation technique status was not assessed). So this research may show patient's practical inhalation technique, determinant factors for inhalation technique and its contribution for control of asthma. It could also show the effect of intervention on inhalation technique and intern asthma control.

1.3 Significance of the study

Previous studies conducted in different countries including Ethiopia have shown that inhalation technique has significant impact on asthma treatment outcome. So patient inhaler technique performance should be continuously evaluated and make immediate intervention to optimize treatment outcome.

Some studies done on determinants of poor asthma control, but there is no studies on evaluation of inhalational technique and its association with treatment outcome in this area. Miss utilization of MDI has great role for control of asthma as study shown which was conducted in different countries outside Ethiopia and in Adis Ababa. So this study therefore aims to evaluate the use of inhaler technique and its determinants with a view to provide possible solutions and appropriate interventions on how to improve the inhaler technique.

This paper may be used as the base line for further research once we identify determinants inhalation technique. Identification of actual problems are important elements of asthma drug therapy and may contribute diminishing drug related morbidity and mortality related with inappropriate use of asthma device.

This finding might also initiate responsible bodies (JUMC) to establish asthma training center, planning to evaluate patient inhalation technique every visit and give immediate appropriate intervention. It may also show need of regular training of health professionals about how to inhale their medication. It may also initiate researchers to assess health care providers on knowledge and the skill of MDI utilization.

1.4 Literature review

1.4.1 Magnitude of inappropriate use of inhaler techniques

According to the study conducted by Manandhar A. et al in Nepal, the highest number of error was found to be done in the step 'take inhaler out of mouth and hold breath for 5-10 sec', where 71.4% of the patients failed to do it correctly. The second most frequent error (57.1%) was 'exhale to residual volume' and 'Lean head slightly back' the third most frequent error (52.4%) was 'exhale away from mouthpiece'. Before intervention, total number of patients who were able to perform all the essential steps of pressurized metered dose inhaler correctly was found to be only 29.52% in number out of total 21 MDI users. The mean score of the patients before and after intervention were 7.75 ± 1.70 and 10.0 respectively. So there was significant improvement in the inhalation technique of the patient after training and counseling(17).

Study conducted by Mandeep K. in India, out of 89 patients using MDI, only 10(11.2%) patients could demonstrate correctly before intervention. About 79 (88.8%) patients had errors in one or more steps of inhaler technique. Most common error was in step 7 i.e. not holding breath for 10 seconds which was seen in 46 patients (51.6%). Patients who had error in step 3 i.e. exhale to residual volume before inhalation were (33.7%). Patients who did not remove cap from canister and were unable to hold the inhaler upright (step1) is about (3.3%)(18).

According to the study conducted by Lara Angelle Micallef in Malta, of 174 patients only 24 (13.7%) of them involved managed to score a total of 8. About 40 (22.8%) patents scored a 7 out of 8 showing that they could nearly do the inhaler rather well but the rest, 111 (63.5%) patients scored 6 or less(16).

Study conducted by G.P. Jolly, A. in India, among 117 patients during baseline evaluation, only 1 subject could perform all the steps of inhaler usage correctly. At the completion of three sessions of intervention, 97.4% of subjects were able to achieve all critical steps. Of these, 28 patients (24.1%) achieved after the first intervention itself while 44 (37.9%) and 41 (35.3%) patients reached the score after 2 and 3 interventions respectively. The commonest errors observed were "not breathing out of the mouth before inhaling" 84.6% of patients and 77.8% of them "not holding breath for 10 seconds or more"(19).

Study done by Alpesh Chauhan et al in India, revealed only 70 out of 193 patients (36.3%) followed all the essential steps. Majority of patients (98.4%) followed the step to place the lips tightly around the mouthpiece and to hold the aerosol as indicated in the manufacturer's instructions (94.3%). While the steps least followed were, breathing out through nose (15%) and rinsing the mouth after use (22.8%)(20).

According to study done by Zlatina I Ivanova et al. in Bulgaria showed that among 34 patients, at visit 1, the most frequent mistakes were short duration of the inhalation and poor synchronization between the canister activation and the inhalation itself (55.88%). Only 2 (5.88%) patients demonstrated correct inhalation technique during their first attempt. At visit 1, patients made more mistakes (on the average, 1 patient made 2 mistakes). At Visit 2, 6(17.65%) patients demonstrated correct inhalation technique. At this visit, the most common mistake was short duration of the inhalation, observed in 7 (28%) patients. In 3 patients, good inhalation technique could not be demonstrated at all. When comparing the number of mistakes at visit 1 and for visit 2, it was found that patients made significantly more mistakes during visit 1(21).

Study which was done in Saudi, revealed among 47 patients, 40 (85.1%) committed at least one critical error. The mean number of critical errors per patient was 1.6. Thirty patients (63.83%) were committed more than one critical error. The proportion of patients who incorrectly performed step 2 (shake the device well before use) was 41%, they did not inhale slowly while actuating the device once during the first half of the inhalation was 71%, and 66% did not continue slow and deep inhalation was (22).

Another study done in Korea showed that, 76.6% of the subjects were graded as efficient and 23.4% as inefficient. The proportion of subjects who accomplished each step, i.e., “shake, remove cap, and hold device properly,” “exhale slowly to residual volume,” “coordinate hand movement and inhalation,” “inhale slowly and deeply,” and “hold breath for 5–10 s” was 74.6%, 28.5%, 81.9%, 75.4%, and 81.2%, respectively(23).

Another study done by Alison Hardwell et al in UK of the 1291 patients, 1275 (99%), 1207 (93%), and 528 (41%), had their MDI technique tested before, once and twice after instruction, respectively. There were 1092 (85.6%) patients who failed the first test, 946 (78.4%) and 347 (65.7%) patients failed the second and third tests. There was a statistically significant increase in the numbers of patients able to use their MDIs correctly following instruction after the second and third tests(24).

Study done by Wafaa G. et al in Egypt, among 53 patients who were on MDI represents inhaler technique of study participants before and after implementation of self-management program, as showed there is great increase in the percentage of participants who have good technique after implementation of self-management program, percentage of good technique was 28.3% which became 81.1 after intervention(25).

Study done by Dudvarski Ilic et al. in Serbia, among 231 patients the percentages of correct inhaler usage for almost all of the steps were initially high (above 90% for steps 1 and 7, above 80% for steps 2 and 5, and above 70% for steps 3, 4, and 6), but statistically significant improvement was evident through the visits 2 and 3 for steps 2–6. For steps 1 and 7, there was no significant increase in correctness of usage, as their correctness was already assessed to be almost 100% at the first visit (26).

1.4.2 Predictors of inhalation technique

Study conducted by Manandhar A. et al in Nepal, among the total number of patients who performed all the correct steps, literate people were able to perform more correctly than the illiterate people 35% and 21% respectively(17).

Study done by Onyedum C. et al. in Nigeria showed that only 31.3% of participants who completed primary school were able to perform more correctly where as 34.8% of were able to perform the essential steps who attend post primary school(27).

Study conducted by AL-Jahdal et al. among 450 patients, improper use had a significant association with irregular clinic follow-ups, lack of education about asthma medication, lack of education about asthma as disease, uncontrolled asthma, and three or more emergency room (ER)visits. Patients with irregular clinic follow-up compared with regular follow-up were more likely to misuse the asthma device (60.9% versus 34.8%). Patients who received no education about asthma medication compared with those who did were more likely to use an asthma device improperly (54.6% versus 38.7%)(28).

According to study done by Alpesh Chauhan et al. in India, among 193 patients essential steps were followed in 21.2% illiterate people, 43.1% people having primary education, 45.2% people having secondary education and 56.5% graduates. Patients having secondary education followed the essential steps significantly less compared to graduates, higher secondary educates. Patients getting instructions for the inhalation technique more than 1 times per year, (52.1%) followed essential steps significantly more compared to patients who got instructions for less than or equal to 1 time per year (31%)(20).

Study done by Andrea Hämmerlein et al. in Germany, among 757 patients, who stated at study entry that they had never received training in correct inhalation technique made more errors in performing inhalation at baseline than those who have had one or more instruction sessions before the study. At baseline, 597 patients (78.9%) made at least one critical error. This number dropped to 214 (28.3%) from the first to the second appointment(29).

Study conducted by Manandhar A. et al in Nepal, males were able to perform all essential steps more correctly than the female population, where 20(34%) of males, and 25% females were able to perform all essential steps in the inhalation technique(17).

Study conducted by Geert N. Rootmensen et al. in Netherlands, among 156 patients, 63(40%) performed at least one essential step incorrectly. This study showed that statistically significant associations of incorrect inhalation technique for older age and absence of received inhalation instruction(30).

Study done by Alpesh Chauhan et al in India, among 193 patients around 29% male and 54.5% females followed all the essential steps. There was also no significant difference between male and female for following the essential steps. However, the patients age more than 40 years (40.4%) followed the essential steps significantly more compared to the patients age less than or equal to 40 years (32.7%)(20).

Another study conducted by Arlette E.et.al in Netherlands, showed that age has no significant association with miss utilization of inhalational medications. According to this study, correct inhalation technique in age group less than 20 is 25.1% where as for those whose age is greater than 20 years is about 23.1%(31).

Study conducted by Pun Sagita in Nepal, among 22 patients who were using MDI, having experience less than 1 year 8%, 1-5 years was 12%, 6-10 years was 3% and more than 10 years were 5% perform correctly. There was significant relationship between correct use of MDI and experience with MDI(32).

Study done by L C Loh, Mrcp et al. in Malaysia, among 134 patients, 78 (58%) had 'efficient' while 56 (42%) had 'inefficient'. There was no significant difference between the 'efficient' and 'inefficient' groups with respect to rate of MDI use experiences. Similarly, there was no significant difference between the 'efficient' and 'inefficient' groups with respect to frequency of asthma exacerbations in the past 12 months(33).

Another study conducted by Zlatina I Ivanova et al. showed that there was no difference in the duration of using inhalers among the patients with correct and incorrect inhalation skills. For the patients with correct inhalation technique the mean duration was 9 years and for those with incorrect technique the result was similar(21)

Study done in USA, patients who self-reported better adherent behavior in the week prior to initial assessment were more likely to maintain correct technique, while patients who reported non-adherent behavior in the week prior to initial assessment were less likely to maintain correct technique, regardless of their asthma knowledge/beliefs, asthma control, perceived asthma control or asthma quality of life (34)

Study done in USA, patients with high confidence ratings regarding inhalation technique were associated with the highest levels of treatment adherence. About 38% patients with high confidence ratings demonstrating high adherence and with medium confidence ratings medium adherence. Low adherence was reported for 64% of patients with low confidence ratings (35).

1.4.3 Association between inhalation technique and asthma control

Study conducted by Tewodros H. et al. in Adiss Ababa among 182 study subjects, 93(51.1%) had experienced an asthma exacerbation in the past 12 months. Only 44 (24.2%) subjects had well-controlled, 41 (22.5%) were partially controlled and 97 (53.3%) were uncontrolled. Among the risk factors studied for uncontrolled asthma, incorrect inhaler technique (62 (34.6%) demonstrated improper inhaler technique(36).

Another study done by AL-Jahdal et al. from the total of 450 asthmatic patients, uncontrolled was 105 (23.3%), partial control was 335(74.4%) and 8 (1.8%) completely controlled. Patients with uncontrolled compared to partially/fully controlled were more likely to use asthma device improperly. Patients with 3 or more ER visits because of asthma exacerbations were more likely to improperly use an asthma device compared to those who visited less than 3 times(50.9% versus 41.3%) (28).

Study done by Giraud V medical visits for worsened asthma condition or emergency visits were more frequent in inefficient inhalers than efficient inhalers. In inefficient as compared to efficient, the greater instability of asthma was reflected, in particular, by more frequent b2-agonist use, recent worsening of asthma and occurrence of serious exacerbation(37).

Study done by Füsün Yıldız et al overall, the ratio of patients with controlled asthma was significantly higher after intervention (61.5% at visit 1, 82.0% at visit 2, 84.8% at visit 3 and 87.3% at visit 4) than that of uncontrolled asthma at each study visit. There was a significant progressive decrease in the ratio of uncontrolled patients at the follow-up visits compared to baseline from 38.5% to 12.7% at the end of the study(38).

Among 231 asthmatic patients done by Dudvarski Ilic et al. in Serbia significant improvement was noted in patients' subjective assessment of the frequency and intensity of symptoms when comparing visit 1 to visit 2 (53.9% vs 74.5%) and also visit 2 to visit 3 (74.5% vs 77%) respectively. The percentage of patients experienced symptoms every night decreased by half (from almost 10% to below 5%). The percentage of patients who had disease-related symptoms one to two nights per week decreased from 18% at visit 1 to 13% at visit 3. Frequency of symptom onset between visits 1 and 3 revealed statistically significant decrease from visit 1 to visit 3. Patients' answers related to their regular everyday activities and their inability to perform them due to disease worsening were compared between visits 1 and 3. Activity limitation is significantly reduced from visit 1 to visit 3(26).

1.4.4 Conceptual frame work

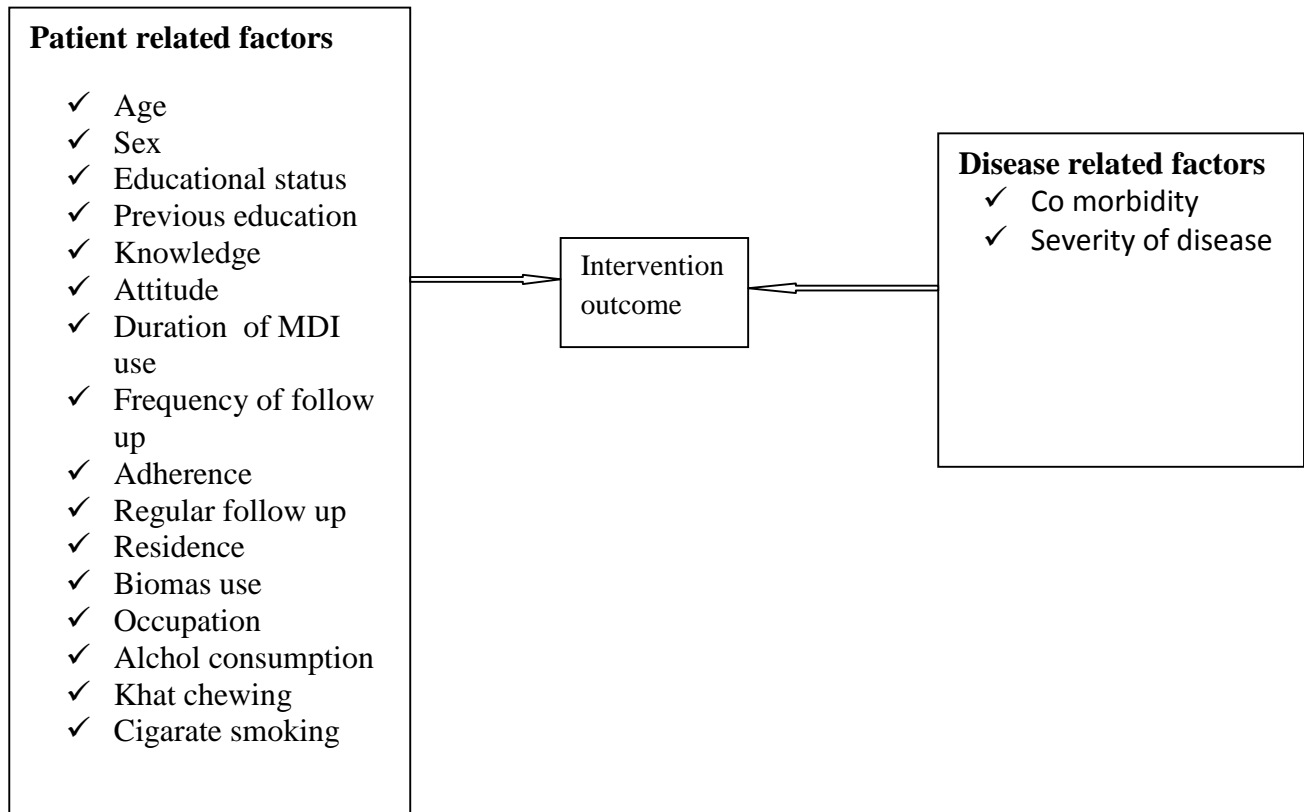


Figure 1: Conceptual frame work for factors associated with inhalation technique and treatment outcome

2. Objectives

2.1 General objective

To evaluate effect of intervention on metered dose inhaler use technique and its association with asthma control among adult asthmatic patients attending outpatient clinic, Jimma University Medical Center (JUMC).

2.2 Specific objectives

- ✓ To assess prevalence inhalation technique
- ✓ To identify determinants of inhalation technique
- ✓ To evaluate inhalation technique and asthma control before and after intervention.
- ✓ To evaluate association between inhalation technique and asthma control

3. Method and participants

3.1 Study area and period

This study was done in JUMC, Jimma, Ethiopia. JUMC is located in Jimma town which is 346km far from Addis Ababa and it is found southwest Ethiopia. It is one of the largest teaching University hospitals in Ethiopia. JUMC is offering diagnosis and treatment for approximately 10,791 patients per month. There are about 9 outpatient clinics located within the hospital which serves over 9592 visits/month(39). Among this outpatient department (OPD) visits, about 45 patients are asthmatic per month(40). This study was conducted specifically at OPD service which is respiratory clinic from March, 22/2018-july, 22/2018G.C.

3.2 Study design

Hospital based Interventinal study was used to assess the effect of intervention on metered dose inhaler use technique and its association with asthma control among asthmatic patients attending respiratory clinic in JUMC

3.3 Population

3.3.1 Source population

All adult asthmatic patients who have followup at outpatient respiratory clinic in JUMC were taken as the source population.

3.3.2 Study population

All adult asthmatic patients who visit the Hospital during data collection period

3.3.3 Sample population

All adult asthmatic patients who satisfy the inclusion criteria were candidate as a subject for the study.

3.3.4 Inclusion and exclusion criteria

Inclusion criteria

- ✓ Patients who are above or equal to 18 years old
- ✓ Patients who were diagnosed with asthma and who were on controller inhalers at least for 3 months
- ✓ Patients who are willing to participate in the study

Exclusion criteria

- ✓ Patients whose age is greater than 75 years old
- ✓ Patients who are in exacerbation during data collection time
- ✓ Patients who are unable to self-administer their MDI(handicap)

3.4 Sample size and sampling procedure

All adult asthmatic patients who met inclusion criteria and presented to hospital in the data collection period were recruited in the following way.

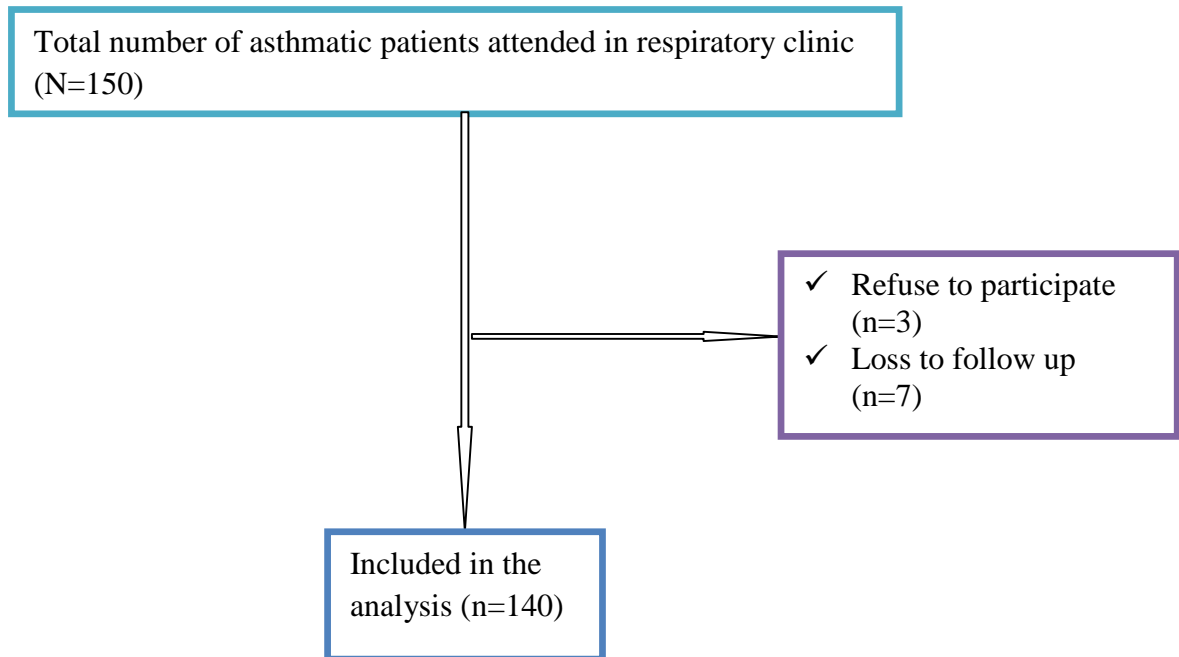


Fig. 2 : Summary of sampling procedure

3.5 Variables

3.5.1 Dependent variables

- Inhalation technique
- Asthma control status

3.5.2 Independent variables

- Age
- Sex
- Alcohol consumption
- Adherence
- Educational status
- Duration of MDI use
- Co-morbidity
- Khat chewing
- Occupation
- Smoking status
- Frequency of follow up
- Knowledge and attitude towards the disease and MDI use
- Severity of disease and exacerbation
- Exposure of biomass use and residence

3.6 Data collection instrument and procedures

Relevant information like patient characteristics, inhalation technique, current medications, co-morbidities, duration of illness and inhaler use were recorded using structured questionnaire (adapted from different published literatures and standard asthma guideline) (1, 8, 23,28, 32, 41, 42). Questionnaire was translated to local language and retranslated to English. Relevant data were obtained by interviewing the patient inhalation demonstration/observation and chart review when necessary. At baseline, data was collected regarding patient demographics, frequency of follow up, inhalation technique, previous MDI instructions and asthma control status. An empty and their own MDI was adapted to enable a patient's inhalation technique to be recorded and patients were asked to use their aerosol just as if they would be at home. Patient baseline inhalation techniques was identified, using a standard check-list of recommended steps by National Institute of Health (NIH) guidelines(43) with 1 point given for each step performed correctly (maximum score = 8). Inhalation technique was dicotomised as efficient and inefficient. Patients who performed three critical steps correctly regardless of the other steps were considered as efficient and otherwise, inefficient(28).

Following base line assessment, patients were given inhalation technique information leaflet and inhalation technique demonstration including patients having mild intermittent asthma who are on salbutamol buff only. Demonstration was given by trainer after 1 day training about inhalation technique. Patients inhalation technique and treatment outcome/asthma control were reevaluated in the 2nd visit. Supplementary information and clarifications on some patient's medical information was obtained through discussion with respective nurses and physician. Identified base line technical inhalation errors and asthma control status were recorded.

3.7 Data quality assurance

Before actual data collection, pre-test was done on 8 patients of patients in order to check if there is missed variables and difficulty of understanding of questionnaires. Data was collected by pharmacist who had basic knowledge on pharmaceutical care services and important inhalation techniques; the data collector and trainer were trained for 1 day on demonstration of inhalation technique and techniques of data collection. Principal investigator was supervised the data collection process and a review. Principal investigator also facilitated a meeting whenever necessary with the data collector and trainer so that any ambiguity was cleared by discussion. During actual data collection, the data was revised for completeness, clarity and consistency by the principal investigators.

3.8 Data analysis

Data was entered into a computer using Epi data 3.1 software and analyzed with SPSS version 21. Before analysis, presence of co linearity between independent factors and model fitness were checked. Chi-square statistics were used to check adequacy of cells for binary and ordinal logistic regression. Independent predictors of outcome and strength of association between dependent and independent variables was identified by using binary and ordinal logistic regression analysis and P-value < 0.25 entered to multiple regression. P value < 0.05 was considered as significant. McNemar and Wilcoxon rank test were used to evaluate whether there is difference between pre and post intervention inhalation technique and asthma control respectively. Descriptive statistics was used to characterize inappropriate utilization of MDI and independent variables. Results of the study were organized in the form of frequencies and percentages. The data was summarized and described using tables and figures.

3.9 Ethical considerations

Letter of ethical clearance was obtained from the ethical review committee of institute of health, Jimma University (JHRPGD/202/2018). Letter for cooperation from department of internal medicine OPD services was obtained. Verbal consent from respective physicians, nurses and patients was secured to extract data from patents' medical charts and to conduct practical demonstration. Privacy and confidentiality were ensured during patient interview and review of patient charts. Thus, name and address of the patient were not recorded in the data collection tool.

3.10 Dissemination plan

The final result of the study will be disseminated to different stake holders such as Pharmacy department of Jimma University, JUMC administrators, Ethiopian Federal Ministry of Health, Ethiopian Food, medicines and health care Administration and Control Authority. Finally, effort will be made to submitte the findigs to reputable professional journal for publication.

3.11 Operational and term definitions

Adherence: The extent to which a patient continues the agreed upon medication as prescribed. It can be measured by test of asthma inhalation (TAI) score. By this score patients who score > 50 is side to be adherent, (46–49) intermediate adherent and (45) non adherent among maximum total value of 54 (45).

Treatment outcome/asthma control: Refers to control, partially controlled or uncontrolled asthma (explained by need of relievers, any night time symptoms and day time symptoms/week) (1)

Efficient: Refers when patients can perform all critical steps regardless of non critical steps(29).

Inefficient: Refers when patients miss any one or more critical steps regardless of performance of non critical steps(29).

Critical step: procedure if it is missed which leads to poor asthma control. These are Place mouthpiece between teeth and lips, simultaneously press canister and breathing in slowly and inhaler out of mouth and hold breath for 5-10 sec(28).

Knowledge: Based on the bloom's cut of point, patients who scored (80-100%) were considered as having good knowledge, (60-79%) moderate and for those who scored ($<60\%$) were considered as having poor knowledge.

Regular follow up: when frequency of follow up of the patient is in line with what the patient is reach in the same consensus with health care providers.

Positive attitude: when the patient score more than the mean score, this is 38 points

Negative attitude: when the patient scores less than the mean

Well controlled: Day time symptoms (no more than twice/week), absence of nighttime symptoms, no limitations in activities, and limited need for rescue medication (not more than twice a week) (1).

Partially controlled: asthma was present when at least any one of the following ; rescue medication use more than twice per week, day time symptoms more than two times/week, night awaking or activity limitation were present in any week(1)

Uncontrolled: Presence of any three or more the above symptoms/ features within any week(1)

Intervention outcome: Treatment outcome/ asthma control and inhalation technique

Exacerbation: Exacerbations (asthma attacks or acute asthma) are episodes of progressive increase in shortness of breath, cough, wheezing, chest tightness, or a combination of these symptoms due to different risk factors(1).

Mild persistent: Day time symptom 2/week but less than 1/day or night time symptoms >2 /month(1)

Moderate persistent: Day time symptoms daily or night time symptoms >1 /week(1)

Sever persistent: Day time symptom continual or night time symptoms frequent(1)

4. Result

A total of 140 patients were included in the study. Of which 78 (55.7%) were females. Overall response rate was 98%. The mean age was 47.8(age range 19-74) years with the maximum number of patients being in the age group of 41-59 years. About 46 (32.9%) patients were farmers. Majority of patients 110(78.57%) found to have isolated asthma. All of study participants were on both salbutamol and beclometasone buff. Thrity patients had drugs for co morbid management. Fifty seven (40.7%) patients had moderate persistent asthma, 35% had severe persistent and the rest 24.3% had mild persistent. Only 3 (2.1%) of the study subjects were currently smokers while 121(86.43%) were non smokers and the rest 16(11.47%) were ex-smpkers. Among study participant, 71(50.7%) patients were illiterate and only 8(5.7%) were attended post secondary school. Seventy seven (55%) and 72(51.4%) patients were drank alcohol and chew khat respectively. Majority of patients 88(62.9%) were exposed to biomass fuels during cooking food and other activities shown in (Table 1). Among these, females were 55(39.29%). The median duration of illness and MDI experience were 4 years (ranges from 4 months-42years) & 3 years respectively. Regarding occupation, 46(32.9%) and 44(31.4%) patients were farmers and employed respectively. Fifty eight (41.42%) patients knew the importance of gargling after inhalation of steroids. Sixty nine (49.3%) had experienced an asthma exacerbation in the past 12 months. About 29.3% patients were dmitted to hospital and only 9.76% admitted more than 2-3 times per year.

Table 1: Socio-demographic and clinical characteristics of participants, respiratory clinic, JUMC, Ethiopia, 2018

Socio-demographics and characteristics of patient	Category	Number	Percent	Mean + SD	Range
Sex	Male	62	44.3		
	Female	78	55.7		
Age group	19-40	46	32.85	47.8±15	19-74
	41-59	52	37.15		
	60-75	42	30.0		
Co morbidity	Yes	30	21.43		
	No	110	78.57		
Severity of disease	Mild persistent	34	24.3		
	Moderate persistent	57	40.7		
	Sever persistent	49	35		
Educational status	Illiterate	71	50.7		
	Primary school	30	21.4		
	Secondary school	31	22.1		
	12+	8	5.7		
Residence	Urban	59	42.1		
	Rural	81	57.9		
Exposure of biomas	Yes	88	62.9		
	No	52	37.1		
Knowledge	Good	30	21.4		
	Moderate	47	33.6		
	Poor	63	45.0		
Attitude	Positive	98	70.0		
	Negative	42	30.0		
Adherence	Adherent	87	62.14		
	Intermediate	30	21.42		
	Non adherent	23	16.44		
Previous education	Yes	60	42.85		
	No	80	57.15		

Sources of patient information about inhalation technique

Among the total patients, 30(21.42%) of them wanted to receive information about how to take their medication. Sixty patients received education about their medication previously from different health professionals. Of these patients, 32(53.3%) of them received from physicians and the rest were educated by other health professionals (Fig. 3). Twenty eight (46.7%) patients received demonstration and the rest 53.3% received verbal instruction. Among total patients who received demonstration, 25 (41.67%) patients were reevaluated: 12(48%) once, 8(32%) twice, 4(16%) three times and only 1(4%) patients reevaluated every visit.

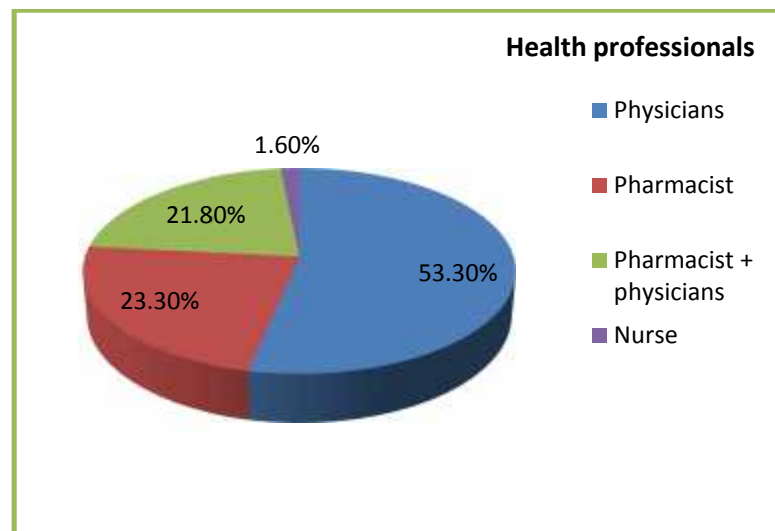


Fig. 3: Sources of patient education about their inhalation technique, respiratory clinic, JUMC, Ethiopia, 2018

4.2 Prevalence of inhalation techniques pre and post intervention

During base line assessment, 139 (99.29%) patients had errors in one or more steps of inhalation technique. In this visit the highest number of error was found to be done in the step inhale slowly deeply and press canister simultaneously where 120(85.7%) of the patients failed to do it correctly. The second most frequent error was take inhaler out of mouth and hold breath for 5-10 sec., 98 (70.0%) and Lean head slightly back is the third most frequent error, 80(57.1%). Before intervention, the most correctly performed steps were shake the inhaler vigorously (5-10 times) and place mouthpiece between teeth and lips, 124(88.6%) and 111(79.3%) respectively. Among 140 patients, 121 (86.42%, 95%CI: 81-92) committed at least one critical error in pre intervention where as it was dropped to 103(73.6%, 95%CI: 66-81) after intervention. The mean number of critical errors per patient was 2.69 in the first visit and which was reduced to 2.09 after intervention.

At the second visit, 130(92.85%) patients had errors in one or more steps of inhaler technique. The highest number of error was found to be done in step inhale slowly, simultaneously press canister and breathing in slowly and deeply which is 97(69.28%). The second most frequent error was lean head slightly back, 69(49.3) and take inhaler out of mouth and hold breath for 5-10 sec was the third most missed step which accounts 54(38.6%). In this visit the most correctly followed step was shake the inhaler vigorously (5-10 times), only 3(2.14%) patients missed this step. Two critical steps, step 7 and step 8 were the most frequently missed steps in both first and second visit. Before intervention, 73(52.14%) patients missed more than one critical step, whereas in the second visit, this number dropped to 36(25.7%).

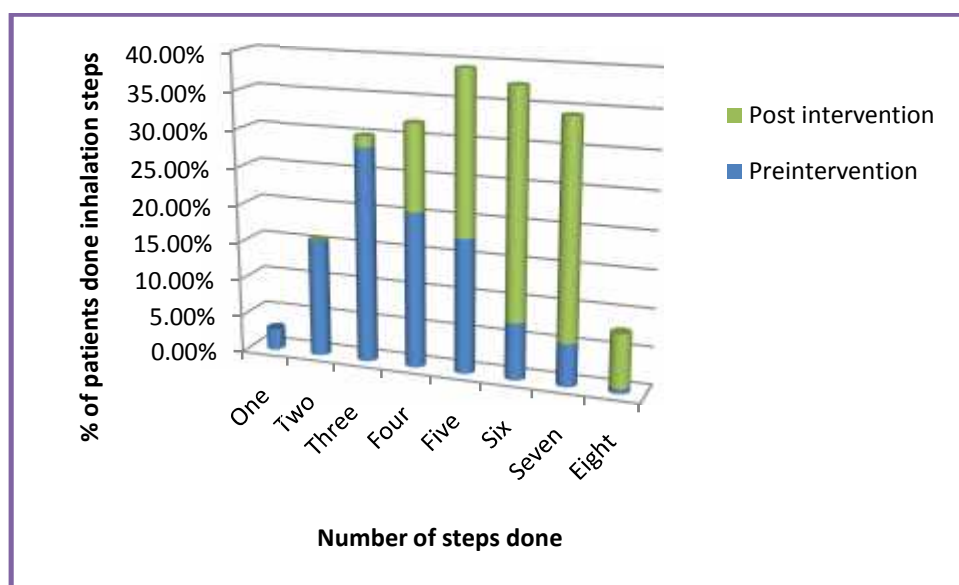


Fig. 4: Number of steps done by the patient pre and post intervention, respiratory clinic, JUMC, Ethiopia, 2018

As shown in the above (Fig. 4), in pre intervention 31.9% patients did more than four steps among total of eight steps and which was increased to 87.1% after intervention. Only 7.86% of patients did six steps in pre intervention, whereas in post intervention, this was increased to 30%. After intervention, there was no patient who did only one or two steps (every patient performed at least three steps). About half of the patients (47.2%) did less than four steps in pre intervention, whereas after intervention only 2(1.4%) patients did less than four steps. The numbers of steps done by the patient were increased after intervention as compared to pre intervention.

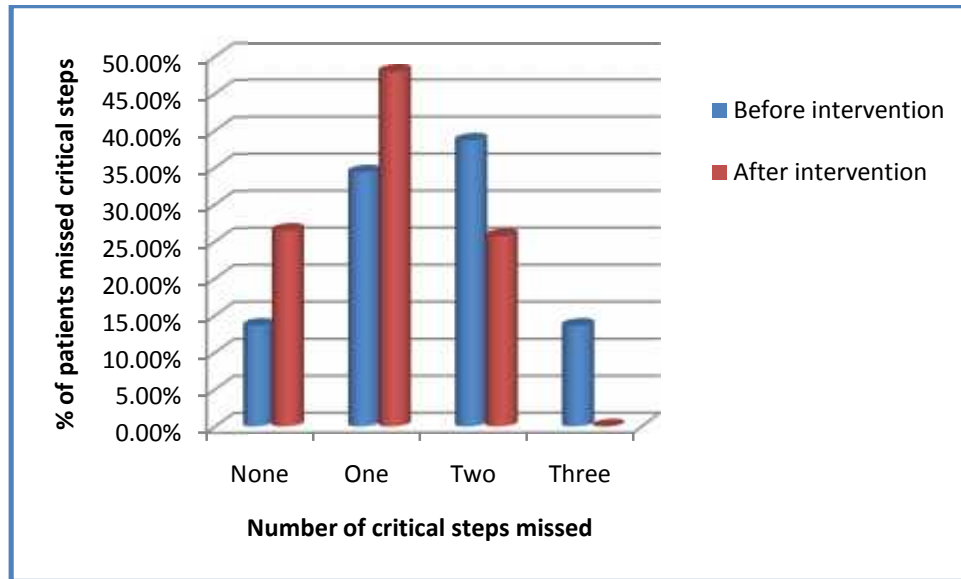


Fig. 5 Number of critical steps missed in pre and post intervention, respiratory clinic, JUMC, Ethiopia, 2018

Before intervention, total number of patients who were able to perform all the eight steps of pressurized metered dose inhaler correctly was found to be only 1(0.71%)(95%CI: 0-2) in number out of total 140 MDI users, whereas in case of post intervention which was 10(7.1%)(95%CI: 3-11%). At the first visit, 19(13.6%) patients incorrectly performed all three critical steps, but after intervention, none of the patients missed all critical steps. Before intervention, the total number of patients who were able to be efficient was only 19(13.57%) but 37(26.42%) in post intervention. After intervention the overall efficiency of inhalation technique was improved by 12.58%, which is significant ($p=0.007$, McNemar test) (Table 2).

The mean score of patient inhalation technique before and after intervention were 3.85 ± 1.51 and 5.94 ± 1.17 respectively. There is a significant reduction in participants' mistakes after intervention in all steps except 1st, 4th and 5th steps (Table 2).

McNemar test was computed to see the effect of intervention on each step of inhalation technique and over all efficiency. In post intervention five of eight steps were significantly improved as compared to pre intervention. In 3 Steps (1, 4, and 5), there were no significant improvement. The over all efficiency is significantly improved at post intervention as compared to pre intervention ($p=0.007$).

Table 2: pre-post performance of inhalation technique, respiratory clinic, JUMC, Ethiopia, 2018

Steps	Before intervention %(n=140)	After intervention %(n=140)	P-value
	Done	Done	
Remove the mouthpiece cover	62.9	65.0	0.982
Shake the inhaler vigorously (5-10 times).	88.5	97.9	0.002
Exhale to residual volume/ normally through mouth	47.1	85.7	<0.001
Exhale away from mouthpiece	50.9	65.7	0.122
Lean head slightly back.	42.9	50.7	.254
Place mouthpiece between teeth and lips (CS).	79.3	92.9	0.04
Inhale slowly, simultaneously press canister and breathing in slowly and deeply(CS).	14.3	30.7	0.002
Take inhaler out of mouth and hold breath for 5-10 sec(CS).	30.0	61.4	0.004
Inhalation technique	Efficient	13.57	0.007
	Inefficient	86.43	

4.3 Factors associated with inhaler use technique

Multivariate logistic regression was done to identify significant independent predictors with controlling of confounding factors. Sex, educational status, knowledge and exposure for previous education were significant predictors whereas age, adherence, duration of MDI experience and attitude were not significant predictors.

Among the total number of patients who did critical steps, literate people were able to perform more correctly than illiterate patients. Illiterate patients who missed more than one critical step accounts about 17.23%. Among all efficient patients, 26.6 % illiterate, 32.14 patients having primary education, 35.1% people having secondary education, 10.8% people having post secondary education. Illiterates were less likely efficient as compared to patients having post secondary education ($p=0.018$).

Among inefficient patients, 17.5% patients having good knowledge, 34.0% patients having moderate knowledge and the rest 48.5% patients having poor knowledge. Among the total of 39 patients who missed more than one critical step, 20(51.3%) patients were with poor knowledge. Knowledge is significantly associated with inhalation technique. Patients having good knowledge about their medication inhalation technique and self management were more likely efficient than patients with poor knowledge ($p=0.049$).

Among 69 literate patients, 25(36.23%) of them were females and the rest 44(63.77%) were males. Male patients were able to perform all critical steps more correctly than female patients, where 26(70.27%) of male patients, and 11(29.73%) female patients were able to perform all critical steps in the inhalation technique. Sex is significantly associated with inhalation technique ($p=0.022$).

Patients who had previous education is more likely use asthma device efficiently as compared to who had no educational exposure ($p=0.031$) (Table 3).

Table 3: Bivariate and multivariate analysis for predictors of inhalation technique among asthmatic patients, respiratory clinic, JUMC, Ethiopia, 2018

Variables		Efficiency (%)		Bivariate analysis	Multi variate analysis		
		Yes	No	COR(CI)	P-value	AOR(CI)	p-value
Sex	Male	26(70.3)	36(35.0)	3.23(0.1-0.51)	0.01	3.844(1.22-12.16)	0.022
	Female	11(29.7)	67(65.0)	1.00	1.00	1.00	1.00
Age	19-39	9(24.4)	33(32.0)	0.82(0.32-0.21)	0.08	0.59(0.18-2.003)	0.401
	40-59	14(37.8)	42(40.8)	0.55(0.21-1.45)	.224	0.51(0.13-1.92)	0.317
	60-75	14(37.8)	28(27.2)	1.00	1.00	1.00	1.00
Educational status	Illiterate	8(21.6)	63(61.2)	0.19(.068-0.54)	.002	0.25(0.08-0.79)	0.018
	Primary school	12(32.4)	18(17.5)	0.18(0.063-0.49)	.001	0.33(0.095-1.11)	0.074
	Secondary school	13(35.1)	18(17.5)	0.13(.026-0.61)	0.01	0.16(0.024-1.08)	0.059
	12+	4(10.8)	4(3.8)	1.00	1.00	1.00	1.00
Adherence	Adherent	22(59.46)	65(63.1)	0.71(0.29-1.76)	.246	1.058(0.334-1.34)	0.923
	Intermediate adherent	9(24.3)	21(20.38)	0.53(0.12-2.395)	.213	1.38(0.22-8.76)	0.732
	Non adherent	6(16.21)	17(16.52)	1.00	1.00	1.00	1.00
Attitude	Positive	28(75.7)	70(68.0)	1.47(.622-3.46)	.138	2.114(0.744-6.006)	0.16
	Negative	9(24.3)	33(32.0)	1.00	1.00	1.00	1.00
Previous education	Yes	25(67.6)	35(34.0)	4.7(0.111-0.55)	.001	3.14(1.11-8.898)	0.031
	No	12(32.4)	68(66.0)	1.00	1.00	1.00	1.00
Knowledge	Good	15(40.5)	18(17.5)	3.65(1.303-10.21)	.014	3.652(1.008-13.23)	0.049
	Moderate	8(21.7)	35(34.0)	2.98(1.203-7.364)	.018	2.87(0.861-9.543)	0.086
	Poor	14(37.8)	50(48.5)	1.00	1.00	1.00	1.00
Duration of MDI use	3mon-5 year	28(75.6)	68(66)	1.6(0.68-3.764)	0.23	2.2(0.701-6.89)	0.175
	5 year	9(24.4)	35(34)	1.00	1.00	1.00	1.00

Residence	Urban	15(40.5)	44(42.72)	1.1(0.51-2.35)	0.818		
	Rural	22(59.5)	59(57.28)	1.00	1.00		
Exacerbation	Yes	19(51.35)	50(48.54)	0.89(0.42-1.895)	0.77		
	No	18(48.65)	53(51.46)	1.00	1.00		
Frequency of follow up	Every 1 month	21(56.76)	59(57.28)	0.94(0.18-5.01)	0.939		
	Every 2 month	10(27.0)	39(37.86)	0.91(0.163-5.02)	0.91		
	Every 3 month	6(16.24)	6(4.86)	1.00	1.00		
Do you follow regularly	Yes	32(86.5)	84(81.55)	0.69(0.238-2.01)	0.496		
	No	5(20.8)	19(79.2)	1.00	1.00		

4.4 Association between asthma control and use of inhaler devices

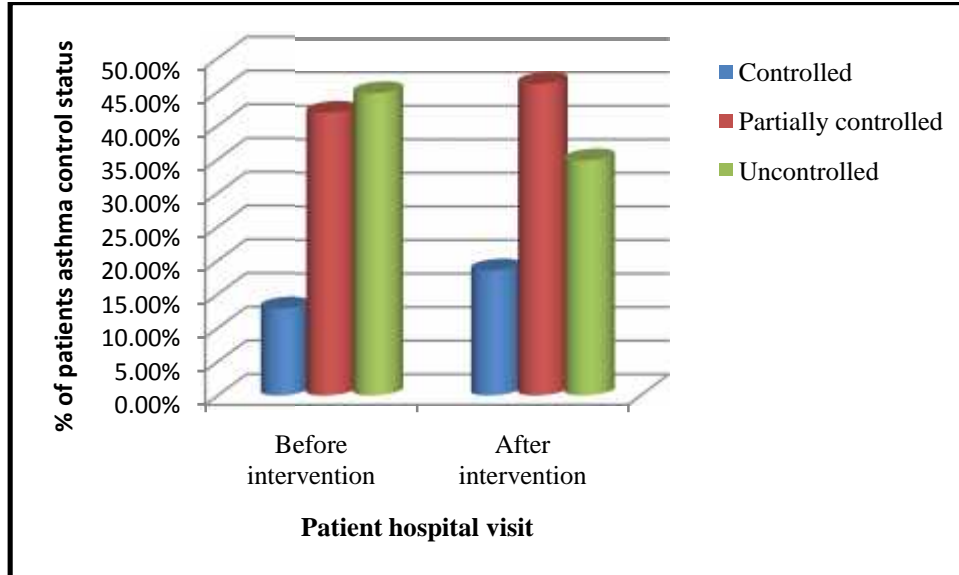


Fig.6: Asthma control status before and after intervention in respiratory clinic, JUMC, Ethiopia, 2018

Before intervention, there were 18(12.9%), controlled, 59(42.1%) partially controlled and the rest of patients were uncontrolled at all. After intervention, 26(18.4%) patients were controlled, 65(46.1%) partially controlled and uncontrolled patients were dropped from 45% to 35% (Fig. 6).

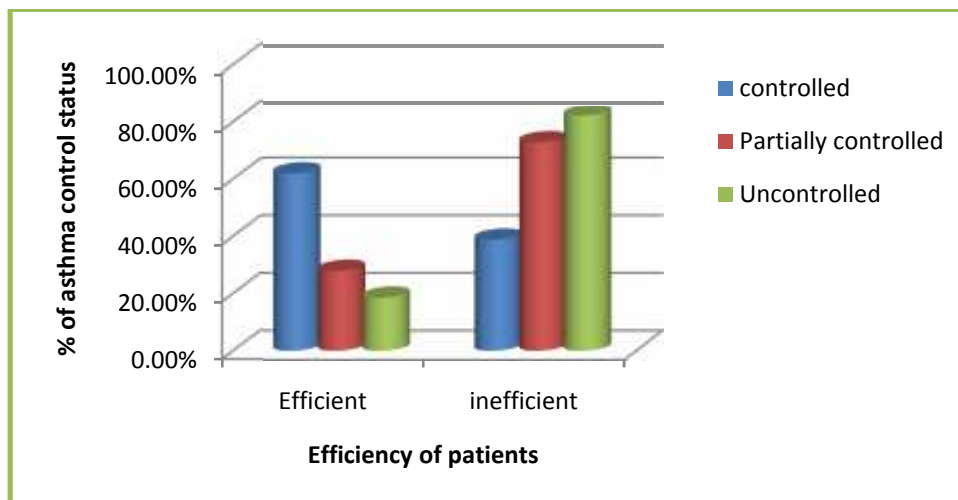


Fig.7: The relationship between inhalation technique and asthma control status, respiratory clinic, JUMC, Ethiopia, 2018.

As shown in Fig. 7, after intervention among the total patients who had controlled asthma, 16(61.5%) of them were efficient. Among patients who had partially controlled asthma, 72.3% patients were inefficient. Proportion of patients with uncontrolled asthma were higher among inefficient as compared to efficient whereas patients with controlled asthma are higher among efficient as compared to inefficient. Patients with uncontrolled asthma as compared to partially controlled/controlled asthma significantly associated with inhalation technique and are more likely to use asthma device improperly (P=0.006, Table 5).

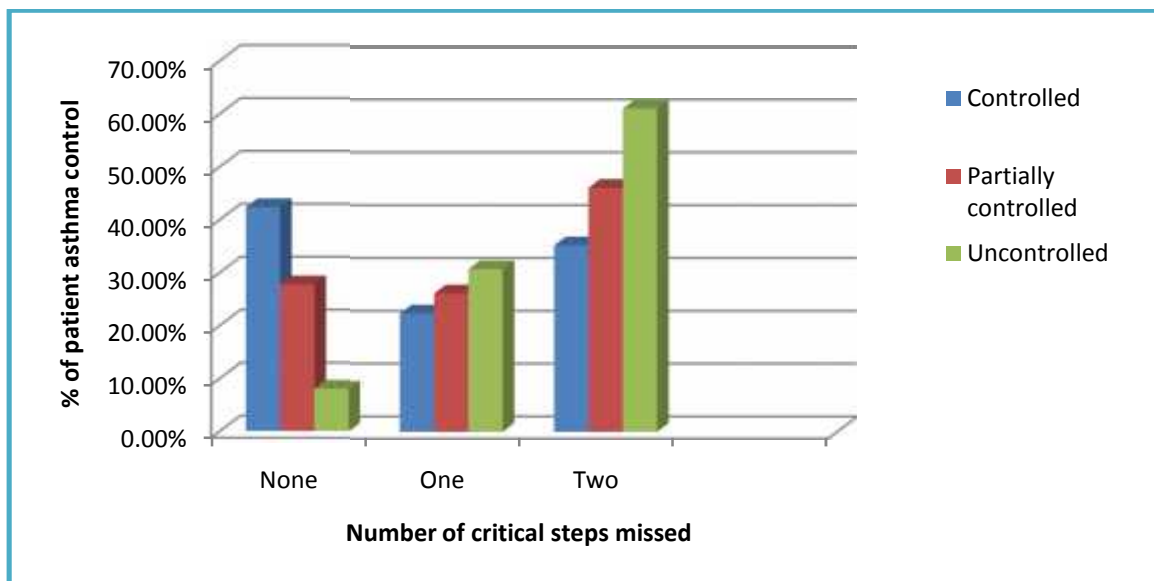


Fig.8: The relationship between asthma control status and number of critical steps missed, respiratory clinic, JUMC, Ethiopia, 2018

Among the total of efficient patients, about 42.3% of them had controlled asthma whereas 8% of patients had uncontrolled asthma. Among the total of uncontrolled patients, 61.2% of them missed two critical steps and 30.8% missed only one critical step. The proportion of partially controlled patients was high in those who missed two critical steps (46.2%). Uncontrolled asthma as compared to partially controlled/controlled asthma was higher in those patients who missed two critical steps. In general, as the number of missed critical steps increases percentage of patients with asthma instability increased.

Wilcoxon rank test was done to compare pre and post intervention treatment outcome. The over all asthma treatment outcome is significantly improved in post intervention as compared to in pre intervention (p=0.008). The numbers of rescue medication use and activity limitation were significantly reduced after intervention as compared to pre intervention (p=0.04 and P=0.036 respectively, McNemar test) (Table: 4).

Table 4: Frequency of rescue medication use, night time symptoms, day time symptoms before and after intervention, respiratory clinic, JUMC, Ethiopia, 2018

Parametrs	Pre intervention (%)		Post intervention (%)	P- value
Activity limitation	Yes	38.6	27.1	0.036
	No	61.4	72.9	
Night time symptom	Yes	76.4	72.9	0.59
	No	23.6	27.1	
Day time symptoms	Yes	64.5	57.9	0.26
	No	35.5	42.1	
Number of daytime symptoms/week	1-2	49.43	59.3	0.856
	> 2	50.57	40.7	
Rescue medication use	Yes	89.9	82.9	0.099
	No	10.1	17.1	
No.ofrescue medication use/week	1-2	30.4	46.5	0.04
	>2	69.6	53.5	
Asthma control	C	12.9	18.6	0.008
	PC	42.1	46.4	
	UC	45.0	35.0	

C= Controlled PC= partially controlled UC= uncontrolled

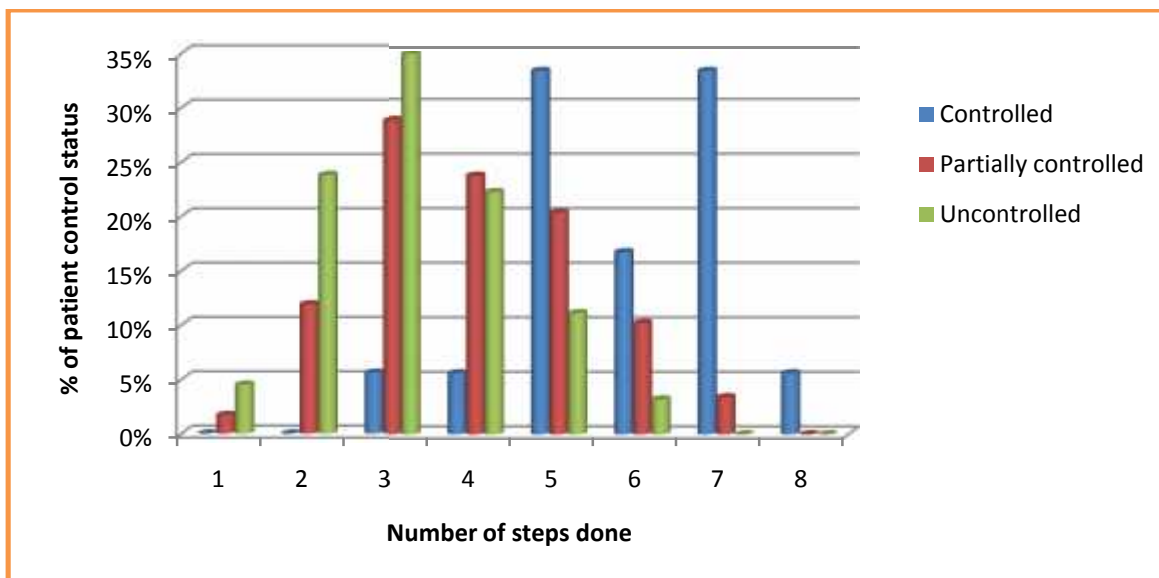


Fig.9: The relationship between number of steps done and asthma control status, respiratory clinic, JUMC, Ethiopia, 2018

As shown in Fig. 9, none of the patients who performed only one and two steps had controlled asthma and none of patients had uncontrolled asthma who did more than six steps. Among all controlled patients, 88.8% of them carried out more than four steps and only 14.3% followed more than four steps among uncontrolled patients. About 33.9% partially controlled patients did more than four steps. The proportion of asthma stability was higher in those patients who carried out more than four steps.

Sixty nine (49.3%) had experienced an asthma exacerbation in the past 12 months. None of the efficient patients faced frequent exacerbation and 13.43% of inefficient faced exacerbations more than 1 times per year. However bivariate logistics regression showed that exacerbation is not significantly associated with inhalation technique ($p=0.77$).

After multiple ordinal logistic regressions only three variables were significantly associated with treatment out come/asthma control. Inhalation technique is one of the predictors and it is significantly associated with asthma control with (p value =0.006). Efficent patients were less likely having uncontrolled asthma as compared to inefficient. However there were no significant association between treatment outcome with age, sex, attitude, exposure of biomass, alcohol consumption, khat chewing and residence (Table 5)

Table: 5 Bivariate and multivariate ordinal regression analysis for predictors of poorly controlled asthma respiratory clinic, JUMC, Ethiopia, 2018

Variables		Asthma control status (%)			Bivariate analysis		Multivariate analysis	
		Controlled	Partially controlled	Uncontrolled	CB(CI)	P-value	AB(CI)	p-value
Age	19-39	46.2	26.2	26.5	-0.56(-1.36-0.26)	.138	-0.74(-1.58-.113)	0.089
	40-59	30.8	43.0	40.8	-0.07(-.82-0.69)	.180	-0.27(-1.07-.52)	0.502
	60-75	23.0	30.8	32.7	1.00	1.00	1.00	1.00
Residence	Rural	57.7	61.5	53.1	-0.196(-0.83-0.44)	.054	0.099(-0.611-.81)	0.784
	Urban	42.3	38.5	46.9	1.00	1.00	1.00	1.00
Exposure of biomass	Yes	53.8	66.2	63.3	0.19(-0.46-0.83)	.174	0.06(-0.66-0.77)	0.879
	No	46.2	33.8	36.7	1.00	1.00	1.00	1.00
Adherence	Adherent	62.06	63.93	62.5	-0.64(-2.02,-0.74)	.236	-1.21(-2.36, -0.064)	0.038
	Intermediate	24.13	21.31	20.83	-0.58(-2.07-0.92)	.247	-1.09(-2.122, -0.061)	0.039
	Non adherent	13.81	14.76	16.67	1.00	1.00	1.00	1.00
Attitude	Positive	80.8	72.3	61.2	-0.65(-1.34-0.044)	.067	-0.581(-1.31-0.15)	.118
	Negative	19.2	27.7	38.8	1.00	1.00	1.00	1.00
Exacerbation	Yes	42.3	41.5	63.3	0.69(0.06-1.33)	.032	0.77(0.11-1.43)	0.022
	No	57.7	58.5	36.7	1.00	1.00	1.00	1.00
Inhalation technique	Efficient	42.3	27.7	16.3	-.89(-1.614-(-0.17))	.016	-1.064(-1.83, -0.03)	0.006
	Inefficient	57.7	72.3	83.7	1.00	1.00	1.00	1.00

Knowledge	Good	26.92	21.54	24.5	-.12(-0.904-0.67)	0.775		
	Moderate	34.62	30.8	28.57	-.218(-0.94-0.51)	0.557		
	Poor	38.46	52.34	46.93	1.00	1.00		
Comorbidity	Yes	26.72	33.84	22.45	-0.26(-0.95-0.43)	0.46		
	No	73.28	66.16	77.55	1.00	1.00		
Khat chewing	Yes	53.84	49.23	53.0	0.024(-0.59-0.65)	0.94		
	No	46.16	50.77	47.0	1.00	1.00		
Alcohol drinking	Yes	46.16	60.0	53.0	0.07(-0.55-0.69)	0.817		
	No	53.84	40.0	47.0	1.00	1.00		
Drugs other than antiasthmatic	Yes	26.9	21.5	18.4	-.324(-1.1-.435)	0.403		
	No	73.1	78.5	81.6	1.00	1.00		

5. Discussion

This is the first study in Ethiopia in which the inhalation technique of patients with asthma has been tested in practical demonstration and with instructional leaflet. Inhalation technique can be easily tested, since it provides important and detailed information about the strength and duration of the airflow, coordination between activating the canister and inhalation, and how long the patient holds breathe after inhalation. This study also showed us the effect of training on efficiency of technique and its association with treatment outcome/asthma control. The method is safe for the patients because a placebo canister was used for MDI devices so as to prevent hygiene related problems.

In this study, it was found that 88.57% of the patients did not use their inhaler devices properly; even though they claimed that they knew how to inhale. Before intervention, majority of the patients believe that they knew how to use their medication but percentage of patients missed critical steps were high in practical demonstration. This result is similar with previous study reported in Europe, Nepal, India and Saudi(10,17,18,22). However, our result is not similar with the the study done in India(20). This discrepancy could be in our study, lower proportion of patient performed correctly two critical steps (step 6 and 8) as compared to previous study.

The most frequent mistake was found to be done in the step inhale slowly, deeply and press canister simultaneously in both pre and post intervention. Similar finding has shown in Bulgari(23). These small proportions of patients followed step 7 is, because this step needs high demands of skills to inhale slowly and understanding, which is better achieved when the patient actually observes the steps being demonstrated rather than simply reading them/verbal instruction. It also suggests that greater emphasis should be given on these specific steps during demonstration especially for those steps which are critical for asthma control.

In this study before intervention, patients made higher number of mistakes as compared to post intervention which is supported by report have shown in Bulgaria and UK(22,24). Only one patient was followed all steps in pre intervention and increased to ten after intervention. The result in pre intervention technique was similar with the result in India by G.P. Jolly, A.(19). But in post intervention, our finding is lower than the previous result. This discrepancy might be because of 50% of study population is illiterate in our study as compared to the previous study which makes difficult for the patient to remember and adhere to what they received. And most of the patients missed non critical steps which do not need high demands of skills to carry out. More than half of the patients were missed more than one critical step which might contribute for poor control of asthma. Mean number of critical error was reduced after intervention as compared to post intervention.

Before intervention, all patients had errors in one or more steps of inhalation technique (except one patient). This could be because of more than half of the patients did not receive any formal education by any health care professionals regarding the proper use of inhaler devices and proportion of patients awareness about their medication and the use of asthma device were low. majority patients followed 6 or less steps which is high as compared to study shown in Malta, it was about 63.5% (16). This difference could be the frequency of follow up in our study participant is longer as compared to the previous study in which the minimum length of follow up is one month. This long duration of follow up could contribute for loss of memory what they received by the health care professionals.

Patients were significantly improved inhaler techniques in much of the steps in post intervention as compared to the first visit. This result is similar with what was found in Serbia(26). The overall inhalation techniques of the patients were significantly improved after intervention. Which is similar with the study done in Nepal, Bulgaria, UK, Egypt and Germany (17,21,24,25,29). In this study the mean score of the patients before and after intervention were lower than the previous study in Nepal(17). This disagreement could be more than half of the patients did not get previous education in our study where as almost all of the patients received from different health professionals and repeated reevaluation including asthma trainers in Nepal.

In our study gender is significantly associated with inhalation technique in which male is about three times more efficient than female patients ($P=0.022$). This study is inline with the previous study done in Nepal(17) but not similar compared with the result reported in India and Nigeria (20,27). There was no significant difference between male and female for following the essential steps. This difference could be the proportion of illiterate of the female patient in our study is high as compared to male patients (67.9% vs 29%) and share of previous education/demonstration is also low in case of females(36.4% vs 53.2%) respectively.

Our study showed that educational status is an important factor for inhalation techniques. Illiterate patients were less likely followed essential steps as compared to patients having post secondary education ($P=0.018$). This study is in line with the previous study conducted in india 21.2% illiterate and 78.8% literate were followed these steps correctly(20).

Patient education about inhalation technique and/particularly practical evaluation is the main tool to target this problem. Different methods can be used to explain to patients and ensure improvement in technique, ultimately enabling patients to master the proper method. Regular re-assessment is important and recommended as patients may lose the adequate technique over time especially illiterate patients.

Patients having good knowledge are more than three times more likely to use inhalers than patients with poor knowledge and this is because patient having good knowledge can be easily shaped by the health care professionals.

Patients, who received prior education on inhalation technique, use asthma device efficiently more than three times as compared to who did not receive ($P=0.031$). It is supported by the study done in India and Netherlands (20,31) in which patients who had never received training in correct inhalation technique made more errors in performing inhalation than those who have had one or more instruction sessions.

The major avoidable factors for improper device use were a lack of education /knowledge regarding asthma as a disease and how the patient use inhaler device correctly. Only 20% of patients received previous demonstration about how to take their medication by the health care professionals and associated with poor asthma device use and subsequent poor asthma control. So the researcher is better to evaluate the competency of health professionals on inhalation technique.

Study done in USA(35), patients who self-reported better adherent behavior prior to initial assessment were more likely to maintain correct technique, as compared to non-adherent behavior to initial assessment were less likely to maintain correct inhalation technique, regardless of their asthma knowledge/beliefs, asthma control, perceived asthma control or asthma quality of life. Our result is not similar with this finding. Despite majority of the patients adherent with their medication, patients continuesly misuse without any regular intervention/reevaluation. This could make the difference with the previous study.

The proportion of patients with uncontrolled asthma was relatively higher in pre intervention as compared to post intervention, demonstrating that inappropriate use of the devices is one of the significant predictors of asthma symptom control. Correct performance of critical steps involved in using the devices was one of the factors affecting asthma symptom control. These steps include inhaling slowly and deeply is crucial for fully delivering the drug to the lung, and, in the present study, this key step was the one with the highest proportion of errors. This might have contributed to the lack of asthma control among those who did not take a slowly and deep inhalation correctly.

The proportion of patients who had daytime symptoms more than twice per week, nighttime time awakening, and activity limitations were higher in our study as compared to the study revealed in Addis Ababa which showed that 62(34.6%) of patients demonstrated improper inhaler technique (36). In our study the proportion of inefficient patient were higher as compared to this finding. So this higher proportion of inappropriate use of asthma device may contribute to higher proportion of asthma instability in this study and it could also be environmental difference.

The overall patients with controlled asthma were higher at visit 2 as compared to visit 1. Asthma controlled status were significantly improved after intervention as compared to base line assessment. Similar studies was found by Füsün Yıldız et al (39). Significant improvement was noted in patients' subjective assessment of the frequency and intensity of symptoms when comparing visit 1 to visit 2. The overall percentage of patients experiencing night time symptoms, activity limitation, rescue medication use and day time symptoms decreased from visit 1 to visit 2. Patient activity limitation and frequencies of rescue medication use were significantly reduced after intervention. Our study is consistent with the previous result reported in Serbia which was revealed that intensity and frequency of symptoms were higher at visit 1 as compared to visit 2 (26).

Multivariate ordinal regression showed that, three variables (exacerbation, adherence and inhalation technique) were identified as independent significant predictors for treatment outcome/asthma control. Efficient patients were less likely to have uncontrolled asthma as compared to inefficient ($P=0.006$). This study is consistent with the previous study done in India, Addis Ababa, Serbia, Italy and France(7,36,26,28,37), showed that inappropriate inhaler technique was associated with poor disease control and increased consumption of health care resources.

5.1. Strength and limitation

There are certain strengths of this study. This is the first time that inhalation technique of patients was tested practical demonstration and the association with asthma control status in the study area.

It is interventional study and so that gave appropriate feedback for the patient

This study also has some limitations:

- Small sample size and short study period
- Only one time reevaluation
- Finally, asthma control status was subjective assessment.

6. Conclusion

The findings of this study revealed that majority of patients claimed to know how to use inhalation devices correctly. Only few patients followed all the essential steps of inhalation technique of MDI before intervention. This study showed that there is significant improvement in inhalation technique after demonstration and counseling which is important for better therapeutic outcomes. But more than half the patients were inefficient even after intervention. So repeated reevaluation during their visit is mandatory to optimize inhalation technique and it improves asthma control.

Previous demonstration, sex, knowledge and educational status were significantly associated with inhalation technique. Inhaler use technique evaluation needs to be undertaken by a healthcare professional and give appropriate feedback immediately. As there are still a lot of illiterate people in our patients, the need for proper counseling during their visit even more important. Therefore, proper and regular training about error-free inhalation technique needs to be conducted to optimize the patient benefit.

Asthma treatment outcome is strongly associated with inhalation technique. After intervention the numbers of efficient patients were relatively increased and subsequent improvement of asthma control. So intervention significantly improves inhalation technique and it improves asthma control. Before increasing inhaled corticosteroids dose or adding the second drug in patients with poorly controlled asthma, better to evaluate patient performance of inhaler technique.

7. Recommendation

For JMUC:

- The hospital should try to adopt a video MDI teaching program. As different studies have shown that Video teaching programs are as effective as personal teaching
- Establish asthma training center and certified respiratory educators such as nurses, respiratory therapists and pharmacists and so that continuous evaluation of inhaler technique should be integral part of asthma treatment

For researchers:

- Evaluate the efficiency of inhalation technique among health care professionals specially those who have direct contact with the patient
- Further study using larger representative sample and long-term effect (repeated reevaluation) of testing education and its association with treatment outcome for more than two visits.

For health professionals:

- Health care provider need to shape patient health education and device use and reassess patient response through continuous follow up
- Regular training sessions should be provided at each visit and encourage patients to bring their inhalers to provide it.
- Health professionals can deliver by verbal instructions, written instructions and physical demonstration of the technique.

For the patients:

- Patient should ask health professionals about how to take their medication.
- Patients should bring their inhaler device to be provided demonstration during health facility visit.

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Annex-I: Patient Information Sheet

Name of investigator: Bezie Kebede

Name of study area: JUMC, Respiratory Clinic

Research budget covered by: Jimma University

Research objective: To evaluate effect of intervention on metered dose inhaler use technique and its association with asthma control among adult asthmatic patients attending outpatient clinic, (JUMC).

Study procedure: The data collectors will interview asthma patients aged 18 years and above attending JUMC respiratory clinic using structured questionnaires.

Risks: This study will not impose any risk on participants.

Participant's right: The patient has a full right to stop the interview at any time and not to allow review of his/her chart, or to skip any question that he/she does not want to answer.

Beneficial: The study is beneficial for patient's quality medication administration and they will benefited from direct demonstration during data collection and provided information written on pre prepared leaflet. It also shows the determinants of poor inhalation technique and its effect on treatment outcome.

Incentives: Patient will not be provided any specific incentive for taking part in the research other than acknowledgment.

Confidentialities: The study result will not include patient's name, specific address and any personal details that may lead to identification of patient. The information that we collect from this research will be kept confidential. Information that will be collected from the study will be kept under lock and key, and it will not be revealed to anyone except the principal investigator and the concerned health professional.

Agreement: Patients are expected to be fully voluntary to participate in the study.

Contact: If you want any detail information and encounter inconveniences about the study you can contact with: **Bezie Kebede**, Cell Phone: [+251921279910](tel:+251921279910) or email address: beza.kebede21@gmail.com

Data collection tool**Part I. general patient information**

1	Age :	-----
2	Sex:	M F
3	Occupation	1. Farmer 2. Merchant 3. Student 4. House wife 5. Employ 6. Daily laborer
4	Smoking status	1. Non smoker 2. Ex-Smoker 3. Smoker
5.	Do you drink alcohol?	1. Yes 2. No
6.	Do you chew khat?	1. Yes 2. No
7	Do you have exposure to biomass fuel during cooking?	1. Yes 2. No
8	Educational status	1 .illiterate 2. primary school 3. secondary school 4. 12+
9	Severity of disease	1. Sever persistent 2. Moderate persistent 3. Mild persistent
10	Co morbidity	1. Yes 2. No
11	Duration of illness	-----
12	Residence	1. Urban 2. Rural
13	Frequency of follow up	-----

Part II Knowledge assessment**I. Asthma**

1	Do you know what asthma is?	1. Yes 2. No
2	Do you know the sign and symptoms of asthma?	1. Yes 2. No
3	Do you know exacerbating factors of asthma?	1. Yes 2. No
4	Does smoking triggers asthma symptoms?	1. Yes 2. No
5	Does exposure to other people tobacco smoke or other smoke triggers asthma symptoms?	1. Yes 2. No

6	Do you know the factors for poor control of asthma?	1. Yes 2. No
II. Medication		
1	Do you know the name of your inhalation medication?	1. Yes 2. No
2	Do you know how the medication is useful for treatment of asthma?	1. Yes 2. No
3	Do you know how to use your inhalational medication?	1. Yes 2. No
4	Do you know that your inhaler technique affects asthma control?	1. Yes 2. No
5	Do you know the importance of gargling after inhalation of corticosteroid?	1. Yes 2. No

1.	What is/are your inhaler medication?	-----
2.	Did you want health professional to ask how to take your inhalation medication?	1. Yes 2. No
3	Do you have antiasthmatic medication other than inhalers?	1. Yes 2. No
4	Do you have drugs other than antiasthmatic?	1 Yes 2. No

Part III. Attitude of patients towards their inhalation and the disease it self

	Questions	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	If i have symptoms of asthma, I will go to seek care medical treatment					
2	I fear that when someone knows I have asthma?					
3	Asthma would be worsened if I miss my inhalation					
4	I fear to take my medication in front of public					
5	I want to miss prescribed medications because of fear of ADR when I take frequently					
6	I want to miss medication because It can cause other diseases like (HTN)					
7	I want to miss medication because once symptoms already started, it is unable to control it					
8	Asthma can be controlled by this medication					
9	I want to miss medication because I can avoid or minimize all asthma triggers rather than taking the medication					
10	I want to miss medication because I feel that it is unnecessary medication					

Part IV inhalation technique

1. National Institute of Health (NIH)-Expert Panel 3 guidelines for inhaler usage technique, (2007)

- a. Remove the mouthpiece cover.
- b. Shake the inhaler vigorously (5-10 times).
- c. Exhale to residual volume/ normally through mouth.
- d. Exhale away from mouthpiece
- e. Lean head slightly back.
- f. Place mouthpiece between teeth and lips(CS).
- g. Inhale slowly, simultaneously press canister and breathing in slowly and deeply(CS).
- h. Take inhaler out of mouth and hold breath for 5-10 sec.(CS).

2	Do you follow your regular follow up?	1. Yes 2. No
3	Do health professionals show you how to take your medication?	1. Yes 2. No
4	If yes , from whom you have received it	1. Physician 2. Pharmacist 3. Nurse 4. physician +pharmacist
5	What type of education?	1. Verbal 2. Demonstration
6	Did you revaluate how you use your inhaled medication?	1. Yes 2. No
8	If yes, how many times has your physician/pharmacist observed you using your inhaled medication?	1. Once 2. Twice 2. Three times 3. Four times 4. Every visit
9	For how long you are using this medication	-----
10	Do you wash your mouth after inhalation of steroid?	1. yes 2. No
11	If no did you develop oral candidiasis?	1. Yes 2. No

Part V adherence (Description of Test of the Adherence to Inhalers (TAI) Questionnaire)

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

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

2. Do you forget to take inhalers?

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

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

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

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

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

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

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

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

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

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

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

11. Does the patient remember the prescribed regimen (dose and frequency)?(cross check with patient medical record)

No (1) Yes (2)

12. The technique of using the evaluated inhaler device by the patient is (checking the inhalation technique) : with critical mistakes (1) Without critical mistakes (2)

Part VI Asthma control (based on GINA, 2017)

1. In the past 1 month, did you:

a. Miss any work, school, or normal daily activity because of your asthma? • Yes • No

b. Wake up at night because of asthma? • Yes • No

c. If yes in question b, how many times/ week?.....

d. Have day time symptoms? • Yes • No

e. If your answer is yes, how many times/week? a. 1-2 b. greater than two

f. Use an inhaler/b2-agonist for quick relief from asthma symptoms? • Yes • No

g. If your answer is yes, how much puffs did you use/week? a. 1-2 b. more than two

2. For the last one year, did you face exacerbation? • Yes • No

3. If yes how many times-----

4. For the last one year, did you admit to hospital? • Yes • No

5. If yes, how many times did you admit? -----.

6. Systemic corticosteroids (from medical card)?----- Yes NO

7. Antibiotics during admission (from medical card)-----Yes NO

Visit 2:

Part VII inhalation technique

1. National Institute of Health (NIH)-Expert Panel 3 guidelines for inhaler usage technique (tick for every correct move)
 - a. Remove the mouthpiece cover.
 - b. Shake the inhaler vigorously (5-10 times).
 - c. Exhale to residual volume/ normally through mouth
 - d. Exhale away from mouthpiece
 - e. Lean head slightly back
 - f. Place mouthpiece between teeth and lips(CS).
 - g. Inhale slowly, simultaneously press canister and breathing in slowly and deeply(CS).
 - h. Take inhaler out of mouth and hold breath for 5-10 sec(CS).

Part VI Asthma control (based on GINA, 2017)

1. In the past 1 month, did you:
 - a. Miss any work, school, or normal daily activity because of your asthma? • Yes • No
 - b. Wake up at night because of asthma? • Yes • No
 - c. if yes how many times per week?-----
 - d. Have day time symptoms? • Yes • No
 - e. If your answer is yes, how many times/week? a. 1-2 b. > 2
 - f. Use an inhaler/b2-agonist for quick relief from asthma symptoms? • Yes • No
 - g. If your answer is yes, how many puffs did you use/week? a. 1-2 b. > 2

አባሪ 1: የታካሚዎች መረጃ

የተመራማሪው ሙሉ ስም: በዜ ከበደ ዘላለም

ጥናቱ የተካሄደበት ቦታ: ጅም ዩኒቨርሲቲ፣ የህክምና ማዕከል

የጥናቱን በጀት የበጀተው መስሪያቤት: ጅም ዩኒቨርሲቲ

የጥናቱ ዋና አላማ: በጅም ዩኒቨርሲቲ የህክምና ማእከል የአስም ታካሚዎችን የሚነፋ መድሃኒት የአጠቃቀም ስልት ለማየትና አስፈላጊውን ግብረ-መልስ ሰጥቶ የመድሃኒት አጠቃቀም ስልትና የበሽታውን ሁኔታ ማየት።

የጥናቱ ሂደት: መረጃ ሰብሳቢዎች እድሜያቸው 18 እና ከዚያ በላይ የሆናቸውንና ቢያንስ ለሶስት ወር አስምን የሚቆጣጠር መድሃኒት የሚወስዱ ታካሚዎች ለዚህ ተብሎ በተዘጋጀ መጠይቅ መረጃ ይሰበስባሉ።

አስጊ ሁኔታዎች: ይህ ጥናት በምንም መልኩ በታካሚዎች ላይ ችግር አይፈጥርም

የተሳታፊዎች መብት: ተሳታፊዎች መረጃ መስጠት የማቆም ብሎም ያለመስጠትና ካርዳቸውን/ፋይላቸውን ያለማሳየት ያለማሳየት ሙሉ መብት አላቸው።

የጥናቱ ጥቅም: ይህ ጥናት ለታካሚዎች የተለያየ ጥቅም ይሰጣል። ቃለ-መጠይቁ በሚካሄድበት ጊዜ ታካሚዎች ስለመድሃኒቱ አጠቃቀም የማያቁትን ነገር ለመጠየቅ እድል ይሰጣል። እነዚህም ይህ ጥናት በጽሁፍ መልክ የተዘጋጀ የማስተማሪያ በራሪ ወረቀት ያድላል። ከዚህም በተጨማሪ መድሃኒታቸውን በደንብ እንዳይጠቀሙ የሚያደርጋቸውን ነገር ይለያል።

ጥቅማጥቅም: ጥናቱ ለታካሚዎች ምንም አይነት ጥቅማጥቅም አይሰጥም

ሚስጥራዊነት: የዚህ ጥናት ውጤት የታካሚዎችን ስም፣ አድራሻና ሌሎች ስለታካሚው ማንነት የሚገልፁ ነገሮችን አይገለፅም። ማንኛውም የታካሚው መረጃ በሚሰጥር የሚያዝና ከዋና ተመራማሪው እና ከ ሚመለከተው የጤና ባለሙያ በስተቀር መረጃው አይሰጥም።

ስምምነት: ታካሚዎች በዚህ ጥናት ለመሳተፍ ሙሉ ፈቃደኛ መሆን አለባቸው።

አድራሻ: ስለጥናቱ የበለጠ መረጃ ለማወቅ ከፈለጉ ስልክ: 0921279910 ወይም ኢሜል: beza.kebede21@gmail.com: በዜ ከበደ

መረጃ የመሰብሰቢያ ቅፅ

ክፍል 1 ጠቅላላ የታካሚዎች መረጃ

1	እድሜ :	-----
2	ጾታ:	ወ : ሴ:
3	የሰራሁኔታ	1. ገበሬ 2. ነጋዴ 3. ተማሪ 4. የቤት እመቤት 5. ተቀጣሪ 6. የቀን ሰራተኛ
4	ሲጋራ የመጨስ ሁኔታ	1. የማያጨስ 2. በፊት የሚያጨስ 3. አሁን የሚያጨስ
5.	አልኮል የጠጣሉ?	1. አዎ 2. አልጠጣም
6.	ጫት ይቅማሉ?	1. አዎ 2. አልቅምም
7	ምግብ ሲያበስሉም ሆነ ሌላ ከጭስ ጋር ግንኙነት አለዎት?	1. አዎ 2. የለም
8	የትምህርት ደረጃ	1. ያልተማ 2. 1ኛ ደረጃ 3. 2ኛ ደረጃ 4. 12+
9	የበሽተው ደረጃ	1. በጣም ከፍተኛ 2. መካከለኛ 3. ዝቅተኛ ደረጃ
10	ከአስም ውጭ ሌላ ተጨማሪ ህመም አለዎት ?	1. አዎ 2. የለም
11	ህመሙ ከጀመርዎት ምንያክል ጊዜ ሆነዎት ?	-----
12	የመኖሪያ ቦታ	1. ከተማ 2. ገጠር
13	ሆስፒታል በየሰንት ጊዜው ይመጣሉ?	-----

ክፍል 2 የእውቀት ዳሰሳ ጥያቄዎች

ሀ. አስምን በተመለከተ

1	አስም ምን እንደሆነ ያቃሉ?	1. አዎ 2. አላቅም
2	የአስም ምልክቶችን ያቃሉ?	1. አዎ 2. አላቅም
3	አስምን የሚያባብሱ ነገሮችን ያቃሉ?	1. አዎ 2. አላቅም
4	ማጨስ አስምን እንደሚያባብስ ያቃሉ?	1. አዎ 2. አላቅም
5	ከሚያጨስ ሰው አጠገብ መቀመጥ አስምን እንደሚያባብስ ያቃሉ?	1. አዎ 2. አላቅም
6	መድሃኒት በሽታውን እንዳይቆጣተር የሚያደርጉ ነገሮችን ያቃሉ?	1. አዎ 2. አላቅም

ለ. መድሀኒትን በተመለከተ		
1	የአስም መድሀኒትዎን ስም ያቃሉ?	1. አዎ 2. አላቅም
2.	መዳኒትዎ ለርስዎ በሽታ እንዴት እንደሚጠቅም ያቃሉ?	1. አዎ 2. አላቅም
3	መድሀኒትዎን እንዴት እንደሚወስዱ ያቃሉ?	1. አዎ 2. አላቅም
4	የመድሀኒት አጠቃቀም ስልተዎ የበሽታውን የመቆጣጠር አቅም እንደሚወስን ያቃሉ?	1. አዎ 2. አላቅም
5	መድሀኒትዎን ከወሰዱ በኋላ አፍዎን መታጠብ ጥቅም እንዳለው ያቃሉ?	1. አዎ 2. አላቅም

1	የርስዎ በትንፋሽ የሚሰዱት የአስም መድሀኒት ምንድን ነው?	-----
2	በትንፋሽ የሚወስዱትን መድሀኒት እንዴት እንደሚወስዱት ለመጠየቅ ጤና ባለሙያ ፈለገው ያቃሉ?	1. አዎ 2. የለም
3	በትንፋሽ ከሚወስዱት ሌላ የአስም መድሀኒት አለውት?	1. አዎ 2. የለኝም
4	ከአስም መድሀኒትዎ ውጭ ሌላ መድሀኒት አለዎት?	1. አዎ 2. የለኝም

ክፍል 3 . ታካሚዎች ስለ አስምና ስለመድሃኒታቸው ያላቸው አመለካከላት

	ጥያቄዎች	በጣም እስማማለሁ	እስማማለሁ	ገለልተኛ	አልስማማም	በጣም አልስማማም
1	የአስም ምልክተ ከታየብኝ ወደ ጤና ተቋም እሄዳለሁ።					
2	ሰው አስም እንዳለብኝ ቢያቅብኝ እፈራለሁ።					
3	መድሃኒቱን ብዘል አስሙ ይባባስብኛል።					
4	መድሃኒቱን ከሰው ፊት መውሰድ እፈራለሁ።					
5	በተደጋጋሚ መድሃኒቱን በመውሰድ የገንዖሽ ችግር ያመጣል ብዬ ስለማስብ መድሃኒቱን እዘላለሁ።					
6	መድሃኒቱን መዘለል እፈልጋለሁ ምክንያቱም የተለያዩ ችግሮችን ለመሳሌ ያደም ግፊት ስለሚያመጣ።					
7	አንዴ የአስሙ ምልክተ ከተነሳ በኋላ መድሃኒት መውሰድ አልፈልግም ምክንያቱም መድሃኒቱ መቆጣጠር ስለማይችል።					
8	ይሄ መድሃኒት አስሙን ይቆጣጠርልኛል።					
9	መድሃኒት ከመውሰድ ይልቅ አስሙን የሚያባብሱ ነገሮቻህን ማስወገድ የተሻለ ነው ብዬ ስለማስብ መድሃኒት መዘለል እፈልጋለሁ።					
10	መድሃኒቱ አይጠቅምም ብዬ ስለማስብ አንዳንዴ መዘለል እፈልጋለሁ።					

ክፍል 4 የመድሃኒት አወሳሰድ ስልት (1. የሚነፋ የአስም መድሃኒትን ለመውሰድ የሚደረጉ ቅደምተከተሎች)

ሀ. የመድሃኒቱን መያዣ እቃ ክዳን መክፈት

ለ. ከ 5-10 ጊዜ መነቅነቅ

ሐ. በአፍ በደንብ ወደውጭ መተንፈስ

መ. ከመድሃኒቱ መያዣ እቃ አርቆ መተንፈስ

ሠ. አንገትን ወደ ኋላ ዘንበል ማድረግ

ረ. ከንፈርን ከመድሃኒቱ መያዣ እቃ ጋር በደንብ ማገናኘት

ሰ. ቀስ እያሉ አየር በመሳብ የመሳሪያውን ጫፍ አንዴ ጫን ማድረግና አሁንም አየር ቀስ እያሉ መሳብ

ሸ. መሳሪያውን ማውጣትና ከ 5- 10 ሴኮንድ ከንፈርን ገጥሞ መቆየት

2	መደበኛ ክትትልዎን ይከታተላሉ?	1. አዎ 2. አልከታተልም
3	ጤና ባለሙያ ስለመድሃኒትዎ አወሳሰድ አስተምረዎታል?	1. አዎ 2. የለም
4	መልሰዎ አዎ ከሁነ፣ ከማን አገኙ?	1. ከሃኪም 2. ከፋርማሲሲስት 3. ከነርስ 4. 1 እና 2
5	ትምህርቱ ምን አይነት ነው?	1. የቃል 2. የተግባር
6	ጤና ባለሙያ ደግመው አሳይቶታል?	1. አዎ 2. የለም
8	መልሰዎ አዎ ከሆነ፣ ስንት ጊዜ ደግመው አሳዩ?	1. አንዴ 2. ሁለቴ 3. ሶስቴ 4. አራቴ 5. በእያንዳንዱ ጉብኝት
9	ይህን መድሃኒት ከጀመሩ ምን ያህል ጊዜ ሆኖዎታል?	-----
10	ቤክሎመታሶን ከወሰዱ በኋላ አፍዎን ይታጠባሉ?	1. አዎ 2. የለም
11	ካልታጠቡ አፍዎ/ጉሮሮዎ ላይ ችግር አመጣ?	1. አዎ 2. የለም

ክፍል 5 መድሃኒቱን በአግባቡ ስለመውሰድ መለኪያ/adherence

1. ባለፉት 7 ቀናት፣ ለምን ያክል ጊዜ መድሃኒት ረስተዋል?
 በሙሉ (1) ከግማሽ በላይ (2) ግማሽ አካባቢ (3) ከግማሽ በታች (4) ምንም (5)
2. መድሃኒት ረስተው ያቃሉ?
 ሁልጊዜ (1) በአብዛኛው (2) አንዳንድ ጊዜ (3) አልፎ አልፎ (4) ፈጽሞ (5)
3. ጥሩ ስሜት ሲሰማዎ መድሃኒት ያቆማሉ?
 ሁልጊዜ (1) በአብዛኛው (2) አንዳንድ ጊዜ (3) አልፎ አልፎ (4) ፈጽሞ (5)
4. እረፍት ላይ ወይም አሁን ቅደሜ መድሃኒት ያቋርጣሉ?
 ሁልጊዜ (1) በአብዛኛው (2) አንዳንድ ጊዜ (3) አልፎ አልፎ (4) ፈጽሞ (5)
5. ስለተበላጩ መድሃኒት አቋርጠው ያቃሉ ?
 ሁልጊዜ (1) በአብዛኛው (2) አንዳንድ ጊዜ (3) አልፎ አልፎ (4) ፈጽሞ (5)

6. የጎንዮሽ ጉዳቱን ፈርተው መድሃኒት አቋርጠው ያቃሉ?

ሁልጊዜ (1) በአብዛኛው (2) አንዳንድ ጊዜ (3) አልፎ አልፎ (4) ፈጽሞ (5)

7. መድሃኒቱ አይጠቅምም ብለው አቋርጠው ያቃሉ?

ሁልጊዜ (1) በአብዛኛው (2) አንዳንድ ጊዜ (3) አልፎ አልፎ (4) ፈጽሞ (5)

8. ሀኪሙ ካዘዘው መጠን በታች ወስደው ያቃሉ?

ሁልጊዜ (1) በአብዛኛው (2) አንዳንድ ጊዜ (3) አልፎ አልፎ (4) ፈጽሞ (5)

9. የቀን ተቀን ተግባራት ያዘባብኛል በማለት መድሃኒት አቋርጠው ያቃሉ?

ሁልጊዜ (1) በአብዛኛው (2) አንዳንድ ጊዜ (3) አልፎ አልፎ (4) ፈጽሞ (5)

10. መግዛት አቅቶዎት መድሃኒት አቋርጠው ያቃሉ?

ሁልጊዜ (1) በአብዛኛው (2) አንዳንድ ጊዜ (3) አልፎ አልፎ (4) ፈጽሞ (5)

11. የሚወስዱትን የመድሃኒት መጠንና በቀን ስነት ጊዜ እንደሚወስዱ ያቃሉ?

አላቅም (1) አዎ(2)

12. መድሃኒትዎን በትክክል ይወስዳሉ(ታካሚው መድሃኒቱን በተግባር ሲወስድ በመመልከት)?

ወሳኝ ቅደም ተከተሎችን የሳቱ (1) ወሳኝ ቅደም ተከተሎችን ያልሳቱ (2)

ክፍል 6 የአስም የህመም ሁኔታ (በ GINA, 2017 መሰረት)

1. ባለፈው 1 ወር በአስሙ ምክንያት:

ሀ. ስራ፣ የላት ከላት ተግባር ወይም ትምህርት አቋርጠዋል? 1. አዎ 2. የለም

ለ. ማታ ከእንቅልፍዎ ተነስተዋል? 1. አዎ 2. የለም

ሐ. መልስዎ አዎ ከሆነ፣ በሳምንት ለምን ያክል ጊዜ?.....

መ. ቀን ቀን ምልክቱ አስቸግሮታል? 1. አዎ 2. የለም

ሠ. መልስዎ አዎ ከሆነ፣ በሳምንት ለምን ያክል ጊዜ? 1. 1-2 2. ከሁለት ጊዜ በላይ

ረ. በፍጥነት ምልክቱን የሚያስታግስ መድሃኒት ተጠቅመዋል? 1.አዎ 2. የለም

ሰ. መልስዎ አዎ ከሆነ፣ በሳምንት ምን ያክል መጠን? 1. 1-2 2. ከሁለት በላይ

2. ባለፈው 1 አመት በሽታዎ ተባብሶብዎት ያለቀጠሮዎት መጥተው ያቃሉ? 1. አዎ 2. የለም

3. መልስዎ አዎ ከሆነ በአመት ስንት ጊዜ-----

4. ባለፈው 1 አመት ባስሙ ምክንያት ሆስፒታል ተኝተው ያቃሉ? 1. አዎ 2. የለም

5. አዎ ካሉ በአመት ስንት ጊዜ? -----.

6. በመርፌ ወይም በአፍ የሚወሰድ የአስም መድሃኒት ወስደዋል(ከካርድ የሚገኝ) ? 1. አዎ 2. የለም

7. ፀረ-ተህወስያን ወስደው ነበር(ከታካሚው ከካርድ የሚገኝ)? 1. አዎ 2. የለም

ቀጠሮ : 2

ክፍል: 4 የመድሃኒት የአወሳሰድ ስልት(1. የሚነፋ የአስም መድሃኒትን ለመውሰድ የሚደረጉ ቅደም-ተከተሎች)

ሀ. የመድሃኒቱን መያዣ እቃ ክዳን መክፈት

ለ. ከ 5-10 ጊዜ መነቅነቅ

ሐ. በአፍ በደንብ ወደውጭ መተንፈስ

መ. ከመድሃኒቱ መያዣ እቃ አርቆ መተንፈስ

ሠ. አንገትን ወደ ሗሳ ዘንበል ማድረግ

ረ. ከንፈርን ከመድሃኒቱ መያዣ እቃ ጋር በደንብ ማገናኘት

ሰ. ቀስ እያሉ አየር በመሳብ የመሳሪያውን ጫፍ አንዴ ጫን ማድረግና አሁንም ቀስ እያሉ አየር መሳብ

ሸ. መሳሪያውን ማውጣትና ከ 5- 10 ሴኮንድ ከንፈርን ገጥሞ መቆየት

ክፍል: 6 የአስም የህመም ሁኔታ (በ GINA, 2017 መሰረት)

1. ባለፈው 1 ወር በአስሙ ምክንያት:

ሀ. ስራ፣ የለት ከለት ተግባር ወይም ትምህርት አቋርጠዋል? 1. አዎ 2. የለም

ለ. ማታ ከእንቅልፍዎ ተነስተዋል? 1. አዎ 2. የለም

ሐ. መልስዎ አዎ ከሆነ፣ በሳምንት ለምን ያክል ጊዜ?.....

መ. ቀን ቀን ምልክቱ አስቸግሮታል? 1. አዎ 2. የለም

ሠ. መልስዎ አዎ ከሆነ፣ በሳምንት ለምን ያክል ጊዜ? 1. 1-2 2. ከሁለት ጊዜ በላይ

ረ. በፍጥነት ምልክቱን የሚያስታግስ መድሃኒት ተጠቅመዋል? 1. አዎ 2. የለም

ሸ. መልስዎ አዎ ከሆነ፣ በሳምንት ምን ያክል ጊዜ? 1. 1-2 2. ከሁለት በላይ

Annex-I: Waraqaa Ibsa Hirmaattotaa

Maqaa Qorataa: Bazzee Kabbadaa

Maqaa Iddoo Qorannoo: Yuunivarsitii Jimmaa Giddu Gala Meedikaalaa, Kilinika Sombaa

Bajata Kan Danda'e: Yuunivarsitii Jimmaa

Ijoo Qormaatichaa: Yuunivarsitii Jimmaatti Giddu Gala Fayyaa (JUMC) Kilinika deddeebi'anii yaalamuu keessa dhukkubsattoota Asmii irratti Haala Fudhannaa fi Adeemsa Fudhannaa dawaa afuuraa irratti kallattiiwwan jiran ilaaluun furmaatota jiran qorachuu fi yaada bal'inaan dhiyeessuu

Adeemsa Qorannoo: Namoonni ragaaleesassaaban dhukkubsattoota Asmii umriin isaanii waggaa 18 ol ta'an, kan JUMC Kilinika Sirna Sombaa dubbisuun (gaaffiif deebiin) kan adeemsifamuudha.

Rakkina Jiru: Qorannoon kun hirmaattota irratti rakkoo tokko hin fidu.

Mirga Hirmaattotaa: Dhukkubsattoonni gaafii fi deebii addaan kutuun dhiisuu akkasumas kaardii isaanii qorannoof akkan hin oolle yoo barbaadan diduus mirga guutuu qabu.

Fayyadamummaa: Qorannoon kun faayidaa kan akka Adeemsa Fudhannaa dawaa afuuraa cimsuu, ragaawwan dhukkubsataa beeksisuu danda'an tokko hin qabaatu. Ragaaleen hirmaattota irraa argaman dhoksaan taa'u. Argamni hirmaattota irraa argaman furtoon chufamanii kan taa'an yemmuu ta'u, Qorannoo gaggeessaa fi nama qaamni illaallatuun ala, nama kamiifuu kan hin kennamneedha.

Kennaa: Hirmaatonni ykn Dhukkubsattoonni kennaa addaa argatan hin jiru. Haa ta'u malee hirmaachuu isanitiif galata guddaa nurra qabu.

Dhoksaa Eenyummaa: Qorannoon Kun Maqaa namaa, Iddoo dhaabbataa jireenyaa akkasumas ragaawwan dhukkubsataa beeksisuu danda'an tokko hin qabaatu. Ragaaleen hirmaattota irraa argaman dhoksaan taa'u. Argamni hirmaattota irraa argaman furtoon chufamanii kan taa'an yemmuu ta'u, Qorannoo gaggeessaa fi nama qaamni illaallatuun ala, nama kamiifuu kan hin kennamneedha.

Walii Galtee: Dhukkubsattooni (Hirmaatonni) fedhii guutuun akka hirmaatan ni barbaadama.

Dabalataan Ragaa Argachuuf: Ragaa dabalataa argachuuf ta'ee rakkinni yoo isin qunname eddo armaan gadii kanaan na argachuu ni dandeessu.

Bazzee Kabbadaa: Bilbila: [+251921279910](tel:+251921279910) ykn Imeelii: beza.kebede21@gmail.com

Gargaartuu Sassaabbii Ragaawwanii

Kutaa I. Ragaa Waliigala Hirmaattotaa

1	Umrii :	-----
2	Saala:	Dhiira • Dhalaa•
3	Hojii	1. Qonnaan Bulaa 2. Daldalaa 3. Barataa 4. Haadha Manaa 5. Hojjetaa Mootummaa 6. Hojjetaa Guyyaa
4	Tamboo ni Xuuxxaa?	1. Eeyyen 2. Miti
5.	Alkoolii ni Dhugdaa?	1. Eeyyen 2. Miti
6.	Jimaa ni Qamaataa?	1. Eeyyen 2. Miti
7	Yeroo nyaata hojjetu gaaziin sitti faca'ee (urgaawee) beekaa?	1. Eeyyen 2. Miti
8	Sadarkaa Barumsaa	1. Hin Baranne 2. Sadarkaa Tokkoffa 3. Sadarkaa Lammaffa 4. Qophaa'inaa fi isaa ol
9	Cimina Dhukkubichaa	1. Baay'ee Dhukkubsatu 2. Dhukkuba Giddu Galeessa 3. Baay'ee hin dhukkubu
10	Dhibee Dabalataa ni Qabduu	1. Eeyyen 2. Miti
11	Erga isin dhukkubuu eegalee hangam ta'ee jira?	-----
12	Bakka Jireenyaa	1. Magaalaa 2. Baadiyyaa
13	Yeroo meeqatti ilaalamuuf deebitu	-----

Kutaa II: Ilaalcha Beekumsaa

II. Asmii

1	Asmiin maal akka ta'e ni beektuu?	1. Nan beeka 2. Hin Beeku
2	Mallattoowwan dhukkuba Asmii ni beektuu?	1. Nan beeka 2. Hin Beeku
3	Asmii maal fa'i akka isinitti cimsu ni beektuu?	1. Nan beeka 2. Hin Beeku
4	Tamboo xuuxuun Asmii ni fidaa?	1. Eeyyen 2. Miti
5	Namni biraa tamboo yoo xuuxu Asmii isin dhukuburrati dhiibbaa ni fidaa?	1. Eeyyen 2. Miti

6	Yeroo Asmii isinitti ka'u maal gochuu akka qabdan hojjettoonni Fayya isinitti himanii beekuu?	1. Eeyyen 2. Miti
II. <u>Dawaa Fudhattan</u>		
1	Dawaa Fudhattan Maqaa isaa ni beektuu?	1. Eeyyen 2. Miti
2	Dawaan Fudhattan Asmiif akka fayyadu ni beektuu?	1. Eeyyen 2. Miti
3	Dawaa Afuuraa akka itti fayyadamtan ni beektuu?	1. Eeyyen 2. Miti
4	Akkaataan fayyadama Dawaa Afuuraa Asmii irratti dhiibbaa akka qabu ni beektuu?	1. Eeyyen 2. Miti
5	Faaayidaa Afaan dhiqachuu ergaa Dawaa Afuuraa fudhattanii ni beektuu?	1. Eeyyen 2. Miti

1	Maqaan Dawaa fudhattanii maal jedhamu?	-----
2	Akkaataa Dawaa itti Fudhattan Hojjettoonni Fayyaa akka sinitti himan ni barbaadduu?	1. Eeyyen 2. Miti
3	Hafuuraan kan fudhatamu qoricha aasmii qabduu?	1. eeyyee 2. Hin qabu
9	Dawaa Asmiin Alaa ni fudhattaa?	1 Eeyyen 2. Miti

Kutaa III: Ilaalcha Dhukkubsattootni Dawaa Afuuraa fi Dhukkubicha Irratti Qaban

	Gaaffilee	Baay'ee Sirriidha	Sirriidh a	Giddu Galeessa	Sirrii Miti	Baay'ee Sirrii Miti
1	Mallatto Asmii yoon qabaadhu dhaabbata Fayyaa deemen gargaarsa gaafadha					
2	Asmii akkan qabu yoo namni beeke nan sodaadha					
3	Yoon Dawaa Afuuraa dhiise Asmiin natti cima					
4	Dawaa bakka namni baay'attetti fudhachuu nan sodaadha					
5	Yeroo baay'ee dawaa fudhadhee rakkina Dawaan fiduuf jecha nan addaan kuta					
6	Dhibee biraa kan akka Dhiibbaa Dhiigaa natti fida jedhhen dawaa fudhachuu dhiisa					
7	Yeroo mallattooleen Asmii natti dhufan dawaan hin fayyisu jedheen addaan kuta					
8	Asmiin Dawaawwan kanaan ni too'atama					
9	Dawaa Asmii fudhachuurra Ofii kallattii biraan too'achuu naaf wayya					
10	Dawaan Asmii sirrii miti jedheen fudhachuu addaan kuta					

Kutaa IV: Akkaataa Fayyadama Dawaa Afuuraa

1. Inistituutii Fayyaa Biyyolessa (NIH) – Paanaalii Beektotaaa 3Akkaataa itti Fayyadama Dawaa Afuuran Fudhatamuu(2007)

- a. Cuftuu Afaan Afuursituu Banuu
- b. Haala Gaariin sochoosuu (Daqiiqaa 5 – 10)
- c. Afuura gara alaa Baafachuu/ inni gaariin Afaaniin
- d. Afaan afuursituu irra afuura baafachuu
- e. Mataa xiqqoo ol qabachuu
- f. Afuursituu Ilkaan fi hidhii jidduu kaa’uu
- g. Afuura Suuta olfudhachuu, achumaan Qaama Afuursituu waliitii diibuu fi suuta suutan afuura fudhachuu, gara keessatti haalan fudhachuu
- h. Afuursituu Afaan keessaa baasuun sakondii 5-10 afuura osoo hin baasin turuu

2	Deddeebii keessan Haalan ni hordoftuu?	1. Eeyyen 2. Miti
3	Hojjettooni Fayyaa akkaataa fudhannaa dawaa isin barsiisanii jiruu?	1. Eeyyen 2. Miti
4	Eeyyen yoo ta’e, Hojjataa kamtubarumsa isiniif kenne?	1. Doktora 2. Faarmaasistii 3. Nursii 4. Doktoraa fi Faarmasistii
5	Gorsa barumsa kamtu isiniif kenname?	2. Afaanin himuun 3. Qaaman isinitti agarsiisuun
6	Dawaa Afuuraa keessan akkamitti akka Fudhattan of duuba deebiin (irra deebiin) ilaalchistanii beektuu?	1. Eeyyen 2. Miti
8	Eeyyen yoo ta’e Doktorri ykn Faarmasiistiin yeroo meeqa dawaa fudhannaa keessan isiniif ilaalanii jiru?	5. Yeroo Tokko 6. Yeroo Lama 7. Yeroo Sadi 8. Yeroo Afur 9. Yeroo Hundaa
9	Erga dawaa kana fudhachuu eegaltanii hangam ta’ee jira?	-----
10	Erga Dawaa Afuuraa (Asmii) fudhattanii afaan ni	1. Eeyyen 2. Miti

	dhiqattuu?	
11	Yoo hin ta'in afaan isin madaayee jiraa?	1. Eeyyen 2. Miti

Kutaa V: Itti Fayyadama Sirraawaa (Gaaffilee itti fayyadama dawaa afuuran fudhatamu sirrii ta'e muldhisan)

1. Guyyaa Torban darbe keessatti, Yeroo meeqaaf dawaa keessan fudhachuu dagattan?
 - (1). Hundumaa (2). Walakkaa ol (3). Walakkaa (4). Walakkaa Gadi (5). Homaa
2. Dawaa Afuuraa fudhachuu dagattanii jirtuu?
 - (1). Yeroo Hundaa (2). Yeroo Baay'ee (3).Yeroo tokko tokko (4). Yeroo xiqqoo (5). Yoomuu hin daganne
3. Wayta isinitti wayyaahuu keessan beektan dawaa addaan ni kuttuu?
 - (1). Yeroo Hundaa (2). Yeroo Baay'ee (3).Yeroo tokko tokko (4). Yeroo xiqqoo (5). Yoomuu addaan hin kunne
4. Wayta Bashannanaa ykn Torbee dawaa fudhachuu ni dhiistuu?
 - (1). Yeroo Hundaa (2). Yeroo Baay'ee (3).Yeroo tokko tokko (4). Yeroo xiqqoo (5). Yoomuu hin dhiisu
5. Yommuu aartan ykn namaan wal loltan dawaa fudhachuu addaan ni kuttuu?
 - (1). Yeroo Hundaa (2). Yeroo Baay'ee (3).Yeroo tokko tokko (4). Yeroo xiqqoo (5). Yoomuu addaan hin kunne
6. Rakkina isa cinaa Dawaan fiduuf jecha dawaa addaan kuttanii beektuu?
 - (1). Yeroo Hundaa (2). Yeroo Baay'ee (3).Yeroo tokko tokko (4). Yeroo xiqqoo (5). Yoomuu addaan hin kunne
7. Dawaan fayyadamaa jirtan dhibee keessaniif gahaa miti jettanii addaan kuttanii beektuu?
 - (1). Yeroo Hundaa (2). Yeroo Baay'ee (3).Yeroo tokko tokko (4). Yeroo xiqqoo (5). Yoomuu addaan hin kunne
8. Dawaa afuuran fudhatamu kan doktorri ajajee gad ta'e fudhattanii beektuu?
 - (1). Yeroo Hundaa (2). Yeroo Baay'ee (3).Yeroo tokko tokko (4). Yeroo xiqqoo (5). Yoomuu hin fudhanne
9. Dawaan Fudhattan jireenya guyyaa guyyaatin walqabata jechuun addaan kuttanii beektuu?
 - (1). Yeroo Hundaa (2). Yeroo Baay'ee (3).Yeroo tokko tokko (4). Yeroo xiqqoo (5). Yoomuu addaan hin kunne

10. Qarshii kaffaltan dhabuu irraa kan ka'e dawaa addaan kuttanii beektuu?
 (1). Yeroo Hundaa (2). Yeroo Baay'ee (3). Yeroo tokko tokko (4). Yeroo xiqqoo (5).
 Yoomuu addaan hin kunne
11. Baay'inaa fi Gosa dawaa isinii ajajamee ni beektuu?
 (1). Eeyyen (2). Miti
12. Adeemsi dhukkubsataan dawaa afuuran fudhatamuu itti fayyadamaa Jiru (Haalan isaan ittiin fayyadamaa jiran ilaaluun)?
 (1). Rakkinoota Waliin fudhachaa jiran (2). Rakkina Malee fudhachaa jiran

Kutaa VI. Too'annaa Asmii (GINA, 2017 irratti hundaa'uun)

1. Ji'a tokkoon darbe keessatti:
- a. Sababa Asmiitin Hojii ykn barumsa irraa haftanii jirtuu? • Eeyyen • Miti
 - b. Halkan sababa Asmiitin Hirriiba keessaa ni kaatuu? • Eeyyen • Miti
 - c. Gaaffii 'b' dhaf Eeyyen yoo ta'e, torbanitti yeroo meeqa? _____
 - d. Mallattooleen Asmii guyyaa guyyaa isinitti ni muldhatuu? • Eeyyen • Miti
 - e. Gaaffii 'd' Eeyyen yoo ta'e torbanitti yeroo meeqa? A. 1-2 B. Yeroo 2 ol
 - f. Dawaan Afuuran Fudhatamu ? B-2 furmaata saffisaaf ni fudhattuu? • Eeyyen • Miti
 - g. Deebiin Eeyyen yoo ta'e, Torbanitti afuursaa meeqa fudhattu? A. 1-2 B. Yeroo 2 ol
2. Waggaa tokkoon darbe keessatti, dhukkubbiin isinitti cimee turee? • Eeyyen • Miti
3. Eeyyen yoo ta'e yeroo meeqa? -----
4. Waggaa tokkoon darbee keessatti mana yaalaa ciistanii jirtuu? • Eeyyen • Miti
5. Eeyyen yoo ta'e yeroo meeqa ciistan? -----.
6. Dawaa Afuuraa fudhattanii?----- • Eeyyen • Miti
7. Dawaa madaa fudhattanii? -----• Eeyyen • Miti

Ilaalcha 2:

KutaaVII: Adeemsa Fudhannaa Dawaa Afuuraa

1. Inistituutii Fayyaa Biyyolessa (NIH) – Paanaalii Beektotaaa 3 Akkaataa (Adeemsa) itti Fayyadaጎa Dawaa Afuuran Fudhatamuu(Kan sirrii ta'e irra mari)
 - a. Cuftuu Afaan Afuursituu Banuu
 - b. Haala Gaariin sochoosuu (Daqiiqaa 5 – 10)
 - c. Afuura gara alaa Baafachuu/ inni gaariin Afaaniin
 - d. Afaan afuursituu irra afuura baafachuu
 - e. Mataa xiqqoo ol qabachuu
 - f. Afuursituu Ilkaan fi hidhii jidduu kaa'uu
 - g. Afuura Suuta olfudhachuu, achumaan Qaama Afuursituu waliitii diibuu fi suuta suutan afuura fudhachuu gara keessatti haalan fudhachuu
 - h. Afuursituu Afaan keessaa baasuun sakondii 5-10 afuura osoo hin basin turuu

KutaaVI:Kutaa VI. Too'annaa Asmii (GINA, 2017 irratti hundaa'uun)

1. Ji'a tokkoon darbe keessatti:
 - a. Sababa Asmiitin Hojii ykn barumsa irraa haftanii jirtuu? • Eeyyen • Miti
 - b. Halkan sababa Asmiitin Hirriiba keessaa ni kaatuu? • Eeyyen • Miti
 - c. Gaaffii 'b' dhaf Eeyyen yoo ta'e, torbanitti yeroo meeqa? _____
 - d. Mallattooleen Asmii guyyaa guyyaa isinitti ni muldhatuu? • Eeyyen • Miti
 - e. Gaaffii 'd' Eeyyen yoo ta'e torbanitti yeroo meeqa? A. 1-2 B. Yeroo 2 ol
 - f. Dawaan Afuuran Fudhatamu ? β-2 furmaata saffisaaf ni fudhattuu? • Eeyyen • Miti
 - g. Deebiin Eeyyen yoo ta'e, Torbanitti afuursaa meeqa fudhattu? A. 1-2 B. Yeroo 2 ol

Jimma University
Institute of Health
School of Pharmacy

Declaration

This is to certify that this thesis is prepared by Bezie Kebede which is entitled by: Effect of Intervention on Metered Dose Inhaler Use Technique and its association with treatment outcome among Asthmatic patients attending outpatient clinic, Jimma University Medical Center, Jimma southwest, Ethiopia: Interventional study. For partial fulfillment of Masters Degree in clinical pharmacy.

I declare that this thesis is my own original work and that has not been presented to any other university for a similar or any other degree award

Signature.....

Date.....

Advisor: Mr. Girma Mamo (B.pharm, M.Sc)

Signature.....

Date.....

Internal examiner:.....

Signature.....

Date.....

External examiner:.....

Signature.....

Date.....