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Quality Of Life Among Asthmatics Based On The Effective Inhaler Techniques And Adherence Towards Inhaler

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Abstract

Background : Asthma is non communicable disease that affected 300 million people with mortality of 4.61 lakhs globally. Global epidemic of asthma has been observed in low to middle income countries, particularly in India, due to whopping expenditure of 487.2 billion INR would said to be spend among Indian adult asthmatics with conservative estimation of prevalence of 2%.

Aim : To evaluate the quality of life among asthmatics based on the effective use of techniques and adherence towards inhaler.

Methods : It was an prospective , hospital based observation study conducted on patients with bronchial asthma. Patient were enrolled in the study their history was recorded and they were asked to use inhaler in the presence of an investigator and the technique were scored. Asthma control and (QOL) of patient were assessed using asthma control questionnaire and mini asthma (QOL) questionnaire.

Results : We enrolled 151 asthmatics based on our study selection Criteria and found majority of 49% of them were at poor asthma control. Also on inspecting, the casual relationship between poor asthma control and discordant inhaler techniques along with improper adherence towards medication there is significant association noted.

Conclusion : In our study, Majority of 49% are show to have poor asthma control . Hence when we attempt to find out the causal relationship between inhaler techniques used and level of adherence toward inhalers. There is significant association noted that is poor inhaler techniques used by patient and poor adherence towards medication are the contributing factor for poor asthma control.

Keywords: Quality of life (QOL) , Test of Adherence to Inhaler (TAI)

Introduction

Asthma, a chronic inflammatory disease of the airway, is characterized by recurrent bouts of shortness of breath, chest tightness, wheezing and coughing in response to stimuli such as allergens, occupational irritants, drugs, and stress. About 300 million people are infected with this disease worldwide, and there is a 50% increase in prevalence for every 10 years. [1].

The goals of asthma treatments are to reduce impairments such as uncontrolled symptoms, frequent use of rescue medication, limitation of activity, decreased quality of life (QOL), and risks such as hospital admission due to exacerbations and loss of lung function [2]. Due to its high global prevalence, large burden on patients, and a high health-care costs, extensive research in the treatment of asthma is underway. Majority of medications in asthma are administered through inhaler devices.

Optimal drug delivery methods become critical in the management of asthma. As per the Global Initiative for Asthma (GINA) guidelines, the ability to deliver drugs directly to airways is a therapeutic advantage [3].

The correct technique and proper use of inhaler ensures effective delivery of drugs to lungs and thus affects the disease control. It is, therefore, imperative for patients with asthma to be educated about the disease and be skilled in inhaler use to improve the treatment outcome. In-depth knowledge about fallacies in inhaler use and its impact on asthma outcomes can be of great significance. Guidelines stress on inhaler technique and adherence to the extent that every recommendation about treatment adjustment includes a reminder to check inhaler technique and adherence at the outset [4].The Global asthma report of 2018 have estimated that the prevalence of asthma in India is about 6% in children and 2% in adults which is1/10th of total asthmatics in the world lives in India. Global epidemic of asthma has been observed in low to middle income countries, particularly in India, due to whopping expenditure of 487.2 billion INR would said to be spend among Indian adult asthmatics with conservative estimation of prevalence of 2%.

Aim And Objectives

Aim :

To evaluate the quality of life among asthmatics based on the effective inhaler techniques and adherence towards inhaler.

Objectives :

1. Grading the severity of asthma based on GINA asthma severity classification system and initiation of appropriate therapy.
2. To assess the inhaler technique used by the asthmatic patients using evaluation of inhaler technique check lists.
3. Scoring adherence to inhaler therapy among asthmatic patients using test of the adherence to inhaler (TAI) questionnaire.
4. To determine factors contributing to ineffective inhaler techniques and its adherence.
5. To analyze level of asthma control using GINA asthma control test questionnaire and to compare the relationship between levels of control with inhaler technique and adherence.
6. To evaluate quality of life using Mini asthma quality of life questionnaire and to correlate the relationship between the level of asthma control and quality of life.

Materials And Methods

Study Design, Setting And Duration :

This is a Prospective, hospital based observational study, carried for the duration of 03 months at ACS medical college and hospitals, Chennai.

Sample size estimation :

Minimum sample size for this study is estimated with the standard formula : $N = \mathbf{Z^2 \times p\ (1 - p) \div d^2}$ Confidence level (Z) – 95% , Precision (d) –8%, Population proportion (p) –50% the estimated minimum sample size is **151**. Collected sample size is **151.**

ISelection criteria :

Inclusion criteria :

1. Adult asthmatic patients above 18 years
   - Patients should have made diagnosed asthma based on GINA
   - Patients should have made one or more prior visit to department of Respiratory medicine
   - Patients receiving inhaled corticosteroid alone or in combination with long acting beta 2 agonists in form of MDI

Exclusion criteria :

1. Asthmatic patients who is not interested or not given consent for participation
2. Asthmatic patients below 18 years
3. Patients failing to complete evaluations for diagnosis proposed in this study
4. Comorbidities that misguide study results
   - Asthma overlapped COPD
   - Obstructive sleep apnea
   - Cardiac comorbidities
5. Chronic or recurrent respiratory infection
6. Asthmatics who need emergency care
7. Diseases that mimic asthma

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- Upper respiratory tract
- Lower respiratory tract like Cystic fibrosis, Bronchiectasis
- Systemic diseases like Pulmonary embolism

Ethical Considerations :

This study was approved by the institutional ethical committee with No. 433 / 2022 / IEC / ACSMCH Dt. 25/02/2022.

Study Tools And Methodology :

1. Structured proforma
2. Standard Diagnostic criteria of asthma
3. Gina classification system of asthma
4. Asthma control test questionnaire (GINA)
5. Checklist for analyzing proper inhaler technique
6. Test to the adherence to inhalers (TAI) questionnaire
7. Mini asthma quality of life questionnaire

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Minimum sample of 151 will be selected according to selection criteria

↓

Face to face pre designed **Proforma** inquiry after taking consent

↓

Diagnosis

- History collection
- Physical examination
- Spirometry with reversibility
- Airway responsive test
- Test for knowing allergic status

↓

Stratification of asthmatic patients using **GINA asthma severity classification system**

↓

Initiation of therapy based on severity of asthma

↓ ↓

Evaluation of **Inhaler technique** using **checklist** + **Adherence** to inhaler therapy – **TAI test** questionnaire

If found improper -

- Distribution of patients education infographics
- Proper demonstration and correction of inhaler techniques
- Training proper inhaler technique
- Counselling regarding importance of adherence to therapy

↓

Application of **Asthma control test** questionnaire (GINA)*

↓

Filling out of **Mini asthma quality of life** questionnaire *

↓

Data interpretation

↓

Hypothesis Testing

Results

Statistical Analysis

Relationship Between Inhaler Technique Vs Asthma Control [Graph 1,2]

On analysing this study, majority of 49% of asthmatics are with poorly controlled asthma based on their ACT score. In due course, on inspecting the casual relationship between the poor asthma control and their inhaler techniques practised in their daily life, there is significant association noted between poor asthma control and improper inhaler practises. Patients who fails to prime their inhaler before every use will have 10% of increased chances (OR = 1.0458) to develop poor asthma control. In an

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average, there is double the time higher possibility to broaden the likelihood of poor asthma control among patients who shows declined efforts to initiate their breath on the mean time of drug actuation (OR = 2.0558, P = 0.02), who hesitate to hold their breath for more than 5 seconds (OR = 2.2803, P = 0.05) and who fails to follow the faultless steps from priming to breath hold if they are advised with more than 1 puff (OR = 2.3149, P = 0.000). Also there is more than 50% of greater fortuity of being in poor asthma control due to crucial errors made in steps of proper mouth seal (OR = 1.7488, P = 0.04), breathing in slowly and deeply (OR = 1.7488, P = 0.01) and removing inhaler at the time of breath hold (OR = 1.6876, P= 0.02)**(graph 1,2).**

Risk Factors Related To Poor Inhaler Technique & Adherence[Graph 3,]

While evaluating the possible factors which contribute to poor adherence and discordant inhaler techniques, there is no significant association found between age, gender and educational status with improper adherence & techniques**(graph 3).** But with odds ratio alone, there is 10% exceeding possibility of middle aged adults (OR=1.0409), female gender (OR = 1.0110) and surprisingly literate (OR = 1.0161) to have discordant techniques and improper adherence among poorly controlled asthmatics. Still, despite of its good odds ratio outcome, these factors cannot be considered as contributing variables and should be ignored due to the chances of error among the population probability is exceeding 5% (P > 0.05).

Relationship Between Inhaler Adherence And Poor Asthma Control[Graph 4,5]Table 1,2,3]

In this study, 15.2% of study populace are shown to have well controlled asthma on the basis of their ACT score. When we analyze the association between well controlled asthma and proper inhaler practises, this study showed to have significant association(graph 5). Therefore, it can be said that asthmatics who never make crucial errors in steps from priming to holding breath properly while using their inhaler will have good level of asthma control. There is more than 2.5 times inflential chances of being in well controlled asthma when ever they cautiously perform, proper breath hold of more than 5 seconds (OR = 2.9455, P = 0.01) and if prescribed with more than one puff, performing error - free steps from priming to the breath hold (OR = 2.9508, P = 0.001). Also there is 20% increased possibility of developing good asthma control among patients who never fails to remove their inhaler from their mouth on breath hold (OR = 2.1471, P = 0.01). Meanwhile, asthmatics who never hesitate to prime their inhaler (OR = 1.8443, P = 0.03), to hold their breath for more than 5 seconds (OR=1.4673, P = 0.03), to initiate their inhalation at the time of drug actuation (OR= 1.5025, P = 0.02) and properly inhale slowly and deeply (OR= 1.6828, P = 0.02) will have appropriately higher possibility of developing good asthma control.(graph 4).

[TABLE 1]

LEVEL OF ASTHMA CONTROL	ADHERENCE LEVEL	
	GOOD	POOR
Well controlled	23	0
Partially controlled	1	53
Poorly controlled	6	68

[TABLE 2]

LEVEL OF	PATTERN OF ADHERENCE FOLLOWED BY ASTHMATICS PATIENTS IN THIS

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ASTHMA CONTROL	STUDY					
	ITEM 01 TO 05		ITEM 06 TO 10		ITEM 11 & 12	
	ERRACTIC	NON ERRACTIC	DELIBERATE	NON DELIBERATE	IGNORANCE	NON IGNORANCE
Well controlled	0	23	0	23	1	22
Partially controlled	53	1	53	1	36	18
Poorly controlled	68	6	68	6	70	4

[TABLE 3]

LEVEL OF ADHERENCE	LEVEL OF ASTHMA CONTROL		CI INTERVAL (95%)	T (DF:43)	CORRELATION COEFFICIENT (r)	P VALUE
	POORLY CONTROLLED (Mean)	POORLY CONTROLLED (S.D)				
Poor adherence	35.444	10.6591	0.0035, 0.5430	2.0381	0.2969	0.04*

ADHERENCE TOWARDS INHALER PRACTICES [TABLE 4,5]

PATTERN OF ADHERENCE	SCORE	COUNT (N)	PERCENTAGE (%)
Erratic pattern	< 25 (Item 01 to 05)	121	80.10%
Non erratic pattern	= 25 (Item 01 to 05)	30	19.90%
Deliberate pattern	< 25 (Item 06 to 10)	121	80.10%
Non deliberate pattern	= 25 (Item 06 to 10)	30	19.90%
Ignorance pattern	< 4 (Item 11 & 12)	107	70.80%
Non ignorance pattern	= 4 (Item 11 & 12)	44	29.20%

In our study, 80.1% of them accounts to have poor adherence towards inhaler practises. On estimating the correlation between the poor adherence among poorly controlled asthma, there is significant association noted. There is board line relationship is noticed between poor asthma control and poor adherence (r = 0.2969, P = 0.04). It can be said that, there is relatively very minor chance to influence poor asthma control by poor adherence level. Also there is no significant association noted between the various improper pattern of adherence to contribute poor asthma control.

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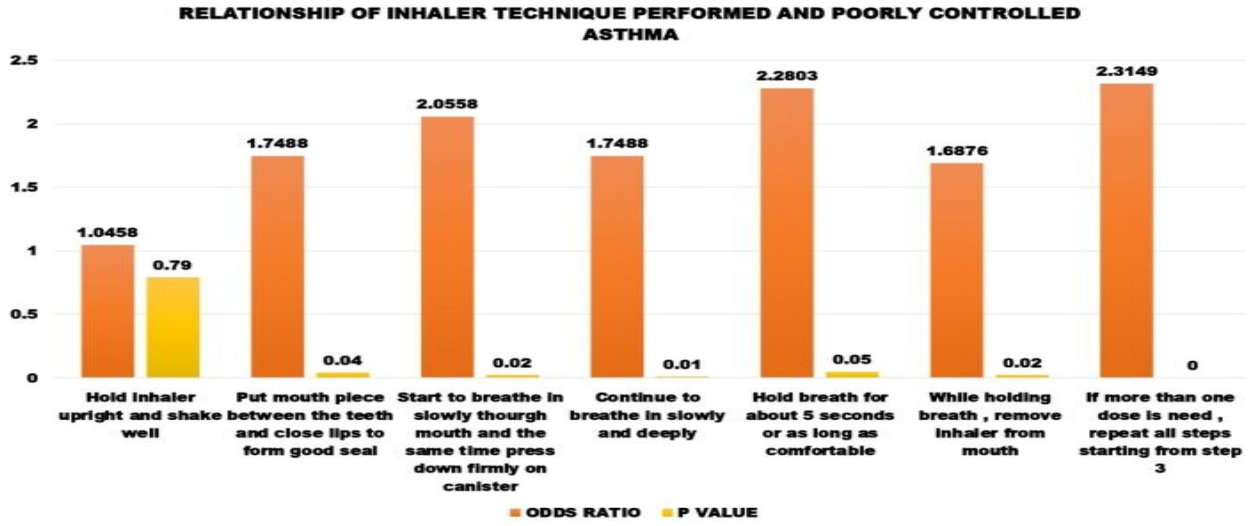
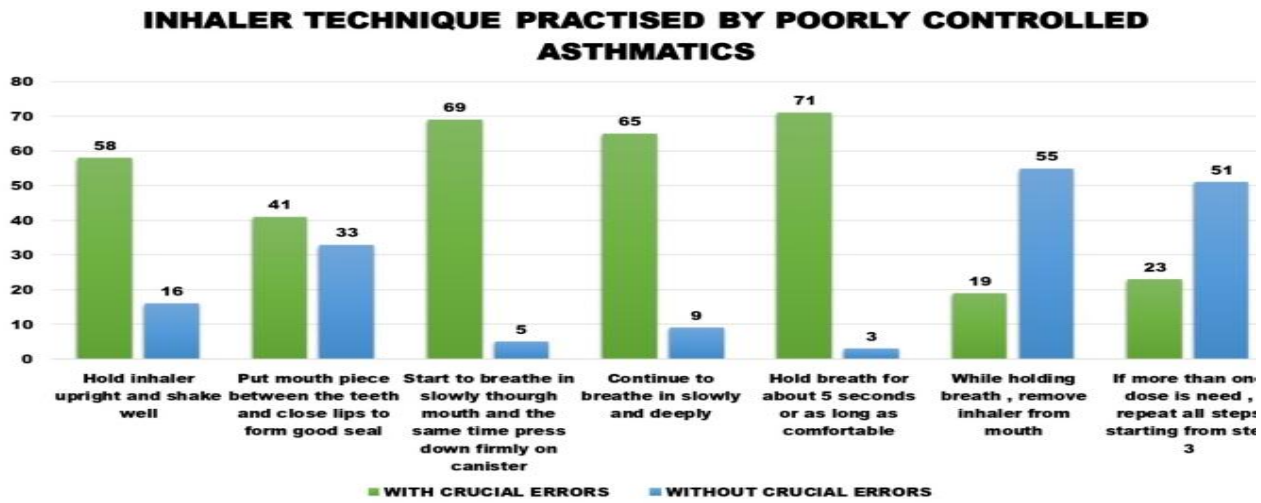
[TABLE 5]

LEVEL OF ADHERENCE	SCORE (1 TO 10 ITEMS)	COUNT (N)	PERCENTAGE (%)
Poor	50 score	121	80.10%
Intermittent	45 to 49 score	0	0%
Good	45 score	30	19.90%

GRAPH 1



GRAPH 2



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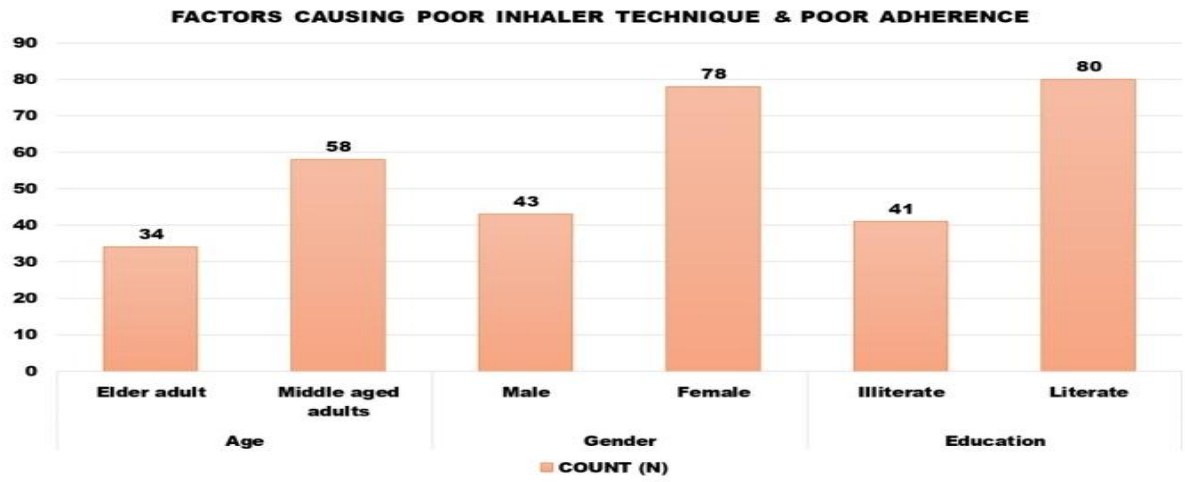
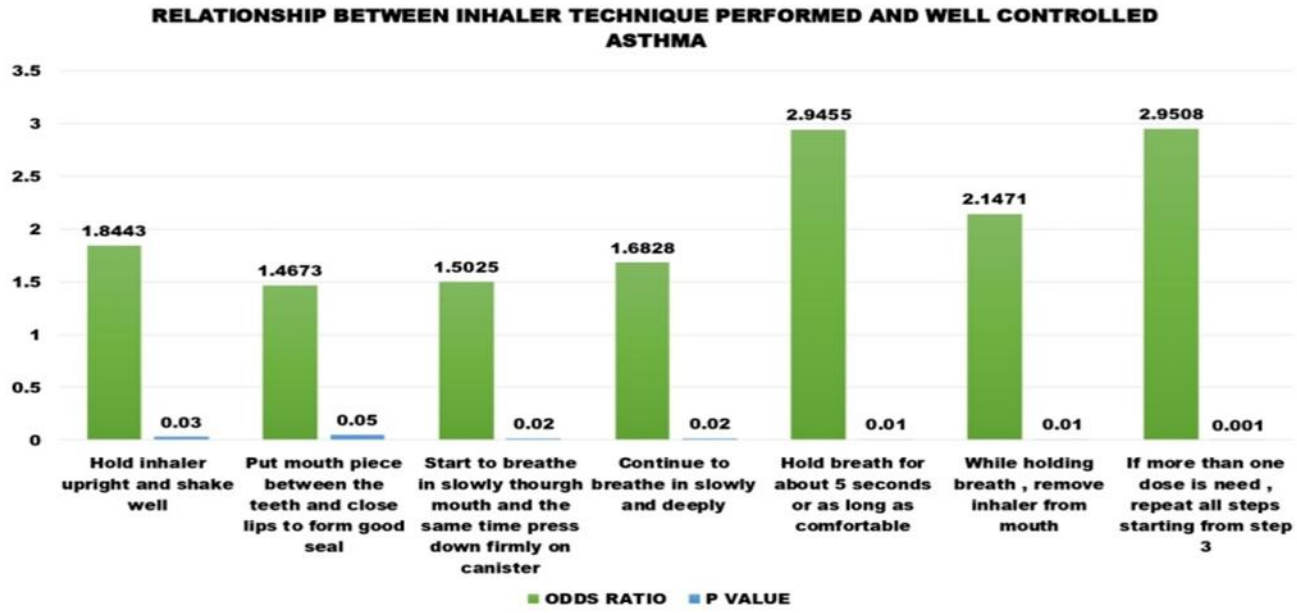
GRAPH 3



GRAPH 4



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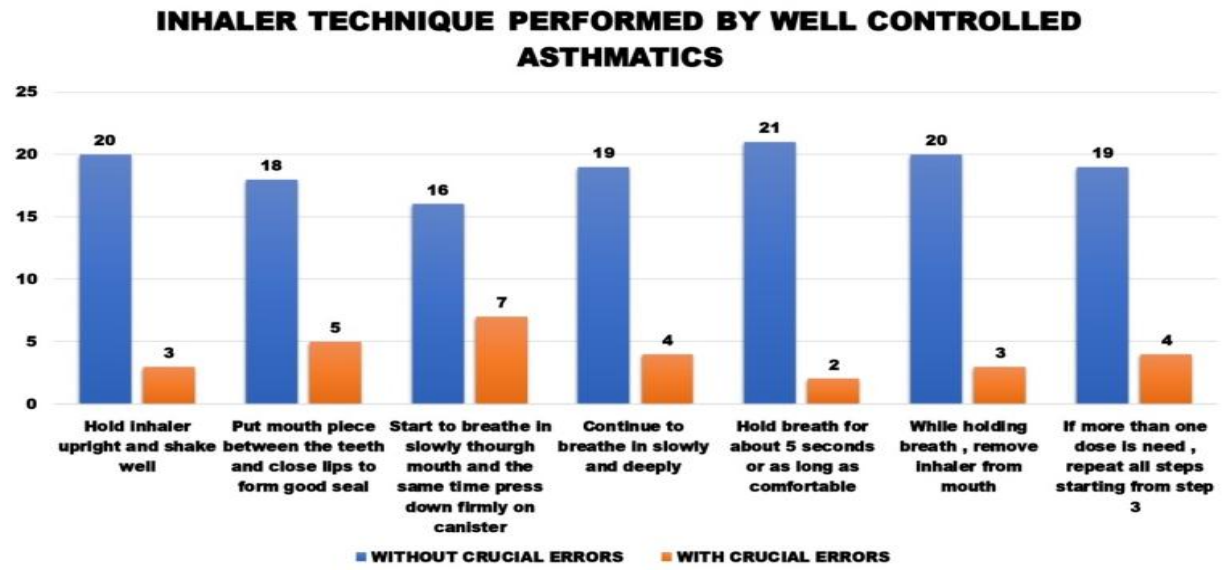
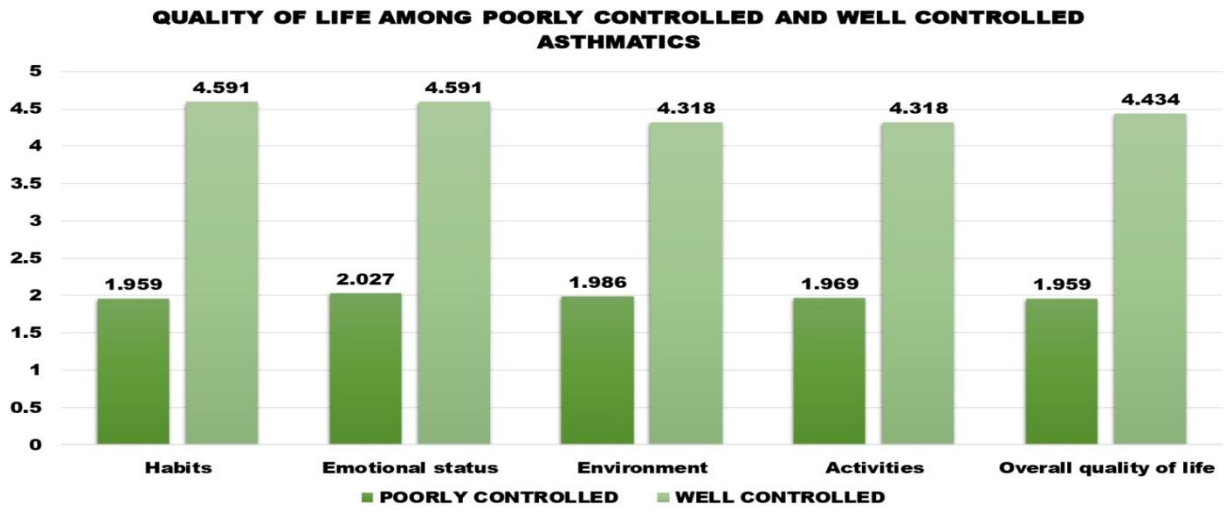
GRAPH 5



GRAPH 6



Relation Between Quality Of Life Vs Asthma Control

On analysing this study, majority of the asthmatics are at poor asthma control. Also there is significant association between poor asthma control and poor quality of life resulted from improper inhaler techniques and poor adherence towards inhaler practises. The overall quality of life among poorly controlled asthmatics with discordant inhaler techniques and poor adherence level is found to having a low grade unsatisfactory quality of life. There is efficiently, increased possibility of having poor quality of life among poorly controlled asthmatics (OR = 5.4784, P = 0.000). Also there is appreciably higher chances of having poorly improved symptoms (OR = 8.4389, P = 0.000), fragile emotional status (OR = 8.8149, P = 0.000), frequent exposure to allergen in environment (OR = 5.8982, P = 0.000) and impaired daily physical activities (OR = 6.4365, P = 0.000) among poorly controlled asthma.

Discussion

Basheti et.al., states there is poor asthma control among there study populace and also there is lack of significance between poor asthma control and improper inhaler techniques alone. There study also

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suggest, there may be multiple factors contributing to poor asthma control which should be considered further. Our study results also noted majority of 49% of poor asthma control patients, but there is significant association noted between poor asthma control and discordant inhaler techniques along with improper adherence towards Medication. Also, poor asthma control is also significantly associated and results to poor quality of life.

Conclusion

In our study, majority of 49% are shown to have poor asthma control. Hence when we attempt to find out the causal relationship between inhaler techniques used and level of adherence towards inhalers, there is significant association noted, that is poor inhaler techniques used by patients and poor adherence towards medication are the contributing factors for poor asthma control. Also there is also significant association found between poor asthma control with poor quality of life. In an average, there is 50% increasing prevalence of asthma every year. Also, most of the studies clearly states that most of the asthmatics were said to have poor asthma control due to numerous factors related to treatment gap which is unclear. Hence we aimed to evaluate the quality of life among asthmatics based on their inhaler techniques and adherence towards inhaler. We enrolled 151 asthmatics based on our study selection criteria and found majority of 49% of them were at poor asthma control. Also on inspecting, the causal relationship between poor asthma control and discordant inhaler techniques along with improper adherence towards medication, there is significant association noted. Further, this study also noted, poor asthma control will influence quality of life, resulting to declined daily quality of life.

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