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A study to assess the effectiveness of mobile health application on self-management of patient with asthma

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Abstract

Background: Asthma is known as a chronic or long term inflammatory medical condition of the airways common among adults, with more than 25 million impacted. An effective way to reduce costs and the harm caused by asthma, like most chronic diseases, is the management of disease by the patients. Mobile health applications with a self-monitoring and medication adherence system can assist with the appropriate self-management of asthma.

Objectives: The main objective of the study to assess the effectiveness of mobile health application on self-management of patient with Asthma.

Methodology: A quantitative approach with pre experimental design, one group pretest and posttest design was adopted for the present study conducted among 60 patients with asthma by using purposive sampling technique was used to select samples. Demographic variables were collected pretest was done by using self-structured questionnaire. The investigator assessed the pre level of asthma symptoms by using modified questionnaire method. Then the group was trained to use mobile health applications for seven days. The mobile health application consists of breathing exercises, medication reminder, diet. The investigator assessed the post test. The data were analyzed by using descriptive and inferential statistics. Result: After intervention the experimental group value of post-test 't' test value 19.648 was found to be statistically significant at p greater than 0.001.

Conclusion: Hence the findings of present study concluded that was significantly improvement in the post test level of asthma symptoms in the selected samples which clearly-infers that mobile health applications on patient with asthma was found to be effective in self-management of patient with asthma symptoms. The study result shows that medical health apps improved asthma control from the clinical outcomes, from the patient reported outcomes.

Keywords: Asthma, mobile health applications, chronic diseases, Asthma patients (18-60 years)

Introduction

Asthma is a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role. In susceptible individuals, the inflammation causes recurrent symptoms of breathlessness, wheezing, chest tightness and cough ^[1]. There is usually widespread airflow obstruction with these episodic symptoms, which is reversible to varying degrees either spontaneously, or with treatment. The inflammation appears to be linked to an increase in airway hyper responsiveness to a variety of stimuli ^[2].

Asthma is a major non communicable disease, affecting both children and adults and it is also most common chronic disease among children. Asthma affected an estimated 262 million people in 2019 and caused 461000 deaths. Asthma is often under diagnosed and under treated, particularly in low and middle income countries ^[3]. Asthma is a long term condition affecting children and adults. The air passage in

the lungs becomes narrow due to inflammation and tightening of the muscles and airways. [4]Asthma affects negatively the different domains of quality of life of the patients due to long term accounts. Asthma is a growing cause of morbidity and mortality. Mobile Health apps are regarded as a multifunctional media to communicate information, share experiences, and collect patients' data, and they are highly customizable, low cost, and easily available. Therefore, this type of intervention has the potential to improve self-management for patients with chronic diseases ^[5, 6].

Mobile health support has the potential to transform health care delivery. Home monitoring application involving mobile device based interactive systems are promising tools for overcoming the above mentioned barriers and supporting self-management of asthma West DM *et al.* (2013) ^[7].

Therefore mobile health could encourage patients to be

more engaged in self-management activities, given the ease of use of their own mobile phone. Multifunctional health apps have good potential in the control of asthma and in improving the quality of life in such patients compared with traditional interventions [8]. The functionalities of asthma apps helps researchers to develop a tailored content for their interventions. Therefore, to determine these functionalities and to support the widespread effective use in clinical practice, in addition to identifying information needs for asthmatic patients, potential effects and the features of health apps should be regularly reviewed Ansari R *et al.* (2017) [9].

A self-management is quite critical to achieving optimum asthma treatment goals. The latest studies have found that training in asthma self-management, which involves a number of varied factors, such as a regular medical review, and a written action plan, appears to improve the health outcomes for patients with asthma Mosnaim GS *et al.* (2012) [10].

Methods and Materials

Pre-experimental design with one group pre-test and post-test design was used to assess the effectiveness of mobile health application on self-management of asthma symptoms among patients with asthma. After obtaining the permission from the Head of the department, TB and Respiratory Medicine, SMCH. The investigator selected 60 samples by using purposive sampling technique. After the sample selecting sample, the investigator explain the purposes of the study and informed consent obtained. Demographic variables were collected pretest was done by using self-structured questionnaire. The investigator assessed the pre level of asthma symptoms by using modified questionnaire method in pre experimental group. Then the group was trained to use mobile health applications. The mobile health application consists of breathing exercises, medication reminder, and diet. The investigator assessed the post test. The data were analyzed by using descriptive and inferential statistics.

Results and Discussion

Table 1: The first objective was assess the pretest and posttest level of asthma symptoms among patients with asthma N = 60

Level of Asthma Control	Good (<15)		Better(16 – 20)		Poor (21 – 30)	
	No.		%	No. %	No.	%
Pretest	0	0	19	31.67	41	68.33
Post Test	10	16.67	43	71.66	7	11.67

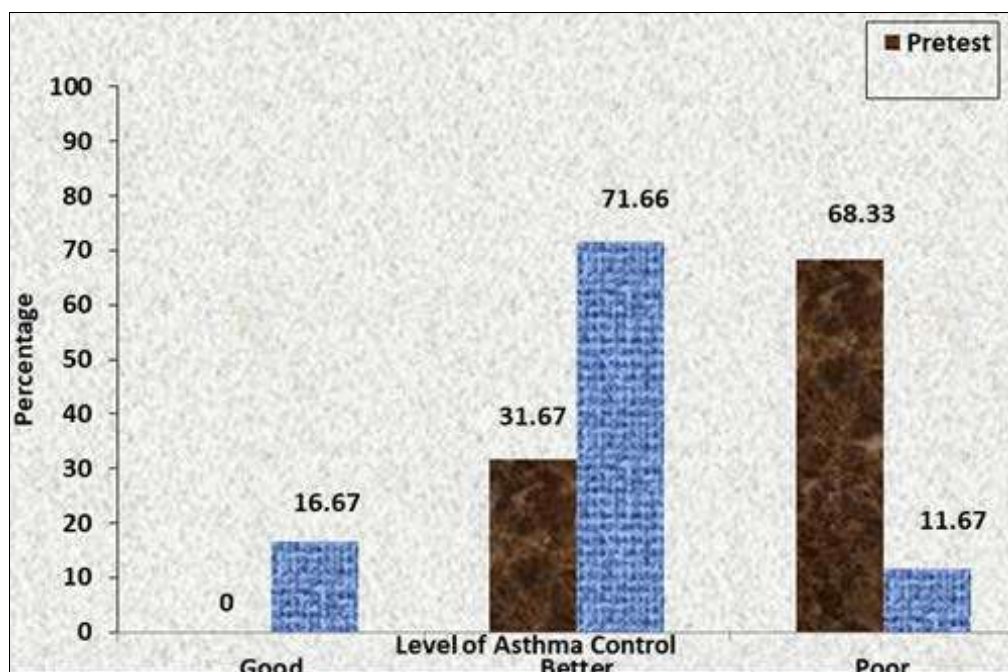


Fig 1: Percentage distribution of pretest and posttest level of asthma control among patients with asthma

The present study shows that in the pretest, 41(68.33%) had poor level of asthma control and 19(31.67%) had better asthma control among patients with asthma.

These findings were supported by a similar study conducted by Adam Gater *et al.* (2016) qualitative research, semi-structured concept elicitation interviews (n = 55), and cognitive interviews (n = 65) with a diverse and representative sample of adults and adolescents with a

clinician-confirmed diagnosis of asthma .The study concluded that saturation was achieved and differences in the experience of participants according to socio-demographic or clinical characteristics were not observed.

The second objective is to determine the effectiveness mobile health application on asthma symptoms among patient with asthma.

Table 2: Comparison of pretest and post-test level of asthma control among patients with asthma N = 60

Asthma Control	Mean	S.D	Paired 't' Test
Pretest	22.27	3.42	t=19.648
Post Test	17.88	2.42	p=0.0001, S***

*** $p < 0.001$, S – Significant

The findings of the present study showed that the calculated paired 't' test value of $t = 19.648$ which was found to be statistically significant at ($p < 0.001$) level, which indicates that mobile health application was found effective in self-management of patient with asthma symptoms.

These findings were supported by a similar study conducted by Laura Adela Munteanu *et al.* (2020). This study included 93 patients diagnosed with asthma that were recalled every three months for a year for assessment and treatment. Patients were divided into two groups. The first group included patients that received treatment, and the second group received treatment and also used the smartphone application. Number of exacerbations and asthma control test (ACT) were recorded. The ACT score was significantly higher for asthma patients using also the mobile application than for the patients using the treatment alone, for all the evaluation moments (Mann-Whitney U test, $p < 0.001$). Also, we found significant differences between the ACT score with-in each group, observing a significant improvement of the score between evaluations and baseline (related-samples Friedman's test with Bonferroni correction, $p < 0.001$). When considering the exacerbations rate, significantly less patients using the application presented exacerbations, 10.30% vs. 46.30% (Pearson Chi-square test, $X^2(1) = 13.707$, $p < 0.001$)

The third objective is to determine to associate the post-test level of asthma symptoms with selective demographic variable

The present study shows that the demographic variable occupation had shown statistically significant association with post-test level of asthma control among patients with asthma at $p < 0.05$ level.

These study were supported by Madison Mackinon (2020) Patients, employers, and healthcare professionals lack awareness and under-report WRA which contribute to the delayed diagnosis of WRA, primarily through lack of education, stigma associated with WRA, and lack of awareness and screening in primary care. Knowledge translation strategies for asthma research typically involve the creation of guidelines for diagnosis of the disease, asthma care plans and tools for education and management. Poor education of employers and physicians in identifying WRA, and education of patients is often done post-diagnosis and focuses on management rather than prevention or screening. The result concluded that occupation had shown statistically significant association with asthma symptoms.

Conclusion

The results of the present study showed that there was significant improvement in the post test effect of mobile health applications in the selected samples which clearly infers that mobile health applications on self-management of patient with asthma symptoms, and the calculated paired 't'

test value of $t = 19.648$ which was found to be statistically significant at ($p < 0.001$) level. Hence the mobile health application was found effective in self-management of patient with asthma symptoms.

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Conflict of Interest

Author declare no conflict of interest

Finding support

None

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