

An Assessment of the Lung Function Status in Diagnosed Male Psoriatic Patients after Antipsoriatic Medication

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DOI: [10.36347/sjams.2019.v07i08.011](https://doi.org/10.36347/sjams.2019.v07i08.011)

| Received: 02.07.2019 | Accepted: 25.07.2019 | Published: 18.08.2019

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Abstract

Original Research Article

Background: Psoriasis is associated with altered pulmonary function. Methotrexate affects the lung function status in psoriatic patients: effect of other antipsoriatic medication on lung function was not evaluated. **Hypothesis:** Antipsoriatic medication affects the lung function status in Psoriatic patients. **Objectives:** To assess the lung function status in diagnosed male psoriatic patients after antipsoriatic medication. **Method:** This cross-sectional study was carried out in the Department of Physiology of Bangabandhu Sheikh Mujib Medical University (BSMMU), Shahbag, Dhaka, from July 2012 to June 2013. A total number of 120 subjects were selected, among which 30 were apparently healthy subjects (control group-A) for comparison and 90 were diagnosed male Psoriatic patients (study Group-B). Controls were selected from the community and the patients from the Indoor and Out Patient Department (OPD) of Dermatology and ventilatory, BSMMU, Dhaka. Based on treatment, these study subjects were further divided into three groups consists of 30 male subjects in each group. These were group B₁ (30 diagnosed male Psoriatic patient receiving only topical therapy), B₂ (30 male Psoriatic patients receiving PUVA therapy), B₃ (30 male Psoriatic patients receiving Methotrexate therapy). The medication was prescribed by physicians of Dermatology and Venereology, Indoor and OPD of BSMMU. Age of all the participants were ranged from 25-45 year and they were matched in terms of age, sex, BMI, occupation and socio economic status. All the lung functions were assessed by measuring FVC, FEV₁, FEV₁/FVC ratio, PEFR, FEF_{25-75%}, FEF_{25%}, FEF_{50%} and FEF_{75%} with a RMS computer based Spirometer. For statistical analysis Independent sample 't' test, ANOVA, Chi-square and Pearson's correlation coefficient test were performed, as applicable. **Results:** The mean percentage of predicted values of lung function variables in healthy male subjects were within normal ranges. Almost all the ventilatory variables were found to be lower in diagnosed male Psoriatic patients taking topical, PUVA or Methotrexate medication in comparison to the healthy controls. In addition, almost all the study variables were significantly lower in the psoriatic patients treated with methotrexate therapy when compared to those patients treated either by only topical therapy or PUVA therapy. Moreover, almost all the study variables were negatively correlated with the duration of therapy in that group of patients treated by only topical medication. On the other, in the patients with PUVA therapy, these relationships were positive for all the study variables except FVC and FEV₁. However, almost all the study variables except FVC, FEV₁ and FEF_{50%} were positively correlated with the duration of therapy in the patients with methotrexate medication. Again, most of the relationship were not statistically significant but FVC and FEV₁ were statistically significant ($p < 0.01$) in group B₁ and B₃, taking only topical and methotrexate medication respectively. **Conclusion:** From this study it may be concluded that the ventilatory variables may decrease more in Psoriatic patients after methotrexate medication than topical or PUVA therapy.

Keywords: Ant psoriatic, Psoriatic, Venereology, Methotrexate, Physiology.

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INTRODUCTION

Psoriasis is a chronic, immune-mediated, inflammatory disease which affects primarily the skin and joints [1,2]. Psoriasis usually manifested as raised, well-demarcated, erythematous oval plaques with adherent silvery scales. The scales are a result of a hyper proliferative epidermis with premature maturation of keratinocytes and incomplete cornification with retention of nuclei in the stratum corneum. Epidermis is thickened with elongated rete ridges; in combination with the dermal inflammatory infiltrate, this contributes to the overall thickness of lesions, which can vary between thick and thin-plateau psoriasis and has been proposed as a distinctive trait [28]. The inflammatory infiltrate consists mainly of dendritic cells, macrophages and T cells in the dermis and neutrophils, with some T cells in the epidermis. The redness of the lesions is due to increased numbers of tortuous capillaries that reach the skin surface through a markedly thinned epithelium [3,4,5]. The general prevalence of psoriasis is 2-4%, but much lower in Asians [6,7,8]. In Bangladesh psoriasis constituted 1.49% of the total dermatological disorder with a male to female ratio of 2.18:1 [9]. The peak incidence is between 20-30 year of age. Approximately 75% patients present before the age of 40 year². The most common clinical variant is plaque psoriasis, occurring in more than 80% of affected patients; up to 40% psoriatic patients develop an inflammatory deforming arthritis termed psoriatic arthritis [10-12]. Though actual etiology of Psoriasis remains unknown but considered as a variably dominant genetically transmitted disease with multifactorial aetiology. Recent studies have demonstrated that geographic region and income are associated with psoriasis [13,14]. Psoriasis is associated with markers of systemic inflammation such as elevated C-reactive protein levels [15]. The precipitating factors, such as smoking, stressful life events, infection, trauma, sunlight, pregnancy, drugs and seasonal variations could influence the development of psoriasis and affect its clinical expression [9]. A significant correlation between psoriasis and COPD was reported in a number of epidemiological studies [16,17,14]. Several investigators has suggested that COPD is an autoimmune disease with a chronic inflammatory state similar to psoriasis [18,19]. Inflammatory cytokines such as CRP, TNF- α , IL-6 and IL-8 have been found to be aetiologically involved in both psoriasis and COPD [18,19,20]. Psoriasis and COPD share some of the same risk factors, including obesity, smoking, and physical inactivity [14,21]. Psoriasis patients have a greater risk of developing COPD [14]. Methotrexate is a commonly prescribed antineoplastic and immune modulating compound that has gained wide acceptance in the management of psoriasis, psoriatic arthritis, rheumatoid arthritis, sarcoidosis and a number of neoplastic disorders. Although generally considered safe and easy to use, methotrexate has been associated with a number of adverse reactions. Various forms of pulmonary

toxicity have been observed. Pulmonary infiltrates are the most commonly encountered form of methotrexate pulmonary toxicity and these infiltrates resemble hypersensitivity lung disease [22]. Patients with methotrexate-induced lung toxicity usually demonstrate a restrictive pattern on pulmonary function tests with decreased carbon monoxide diffusing capacity and increased alveolar-arterial gradient with hypoxemia [23-25]. Small studies suggest deterioration of pulmonary function with chronic methotrexate therapy, particularly in patients with pre-existing obstructive lung disease [26].

OBJECTIVES

General objective

- To assess Spirometry Lung function status in psoriatic patients after antipsoriatic medication.

Specific Objectives

- To measure the FVC, FEV₁, FEV₁/FVC%, PEFR, FEF_{25-75%}, FEF_{25%}, FEF_{50%} and FEF_{75%} in diagnosed psoriatic patients receiving Topical, PUVA and MTX therapy for the assessment of their lung function status.
- To measure all these pulmonary function variables in apparently healthy subjects for comparison.

METHODOLOGY AND MATERIALS

This cross-sectional study was carried out in the Department of Physiology of Bangabandhu Sheikh Mujib Medical University (BSMMU), Shahbag, Dhaka, from July 2012 to June 2013. A total number of 120 subjects were selected, among which 30 were apparently healthy subjects (control group-A) for comparison and 90 were diagnosed male Psoriatic patients (study Group-B). Age of all the participants were ranged from 25-45 year and they were matched in terms of age, sex, BMI, occupation and socio economic status. All the lung functions were assessed by measuring FVC, FEV₁, FEV₁/FVC ratio, PEFR, FEF_{25-75%}, FEF_{25%}, FEF_{50%} and FEF_{75%} with a RMS computer based Spirometer. For statistical analysis Independent sample 't' test, ANOVA, Chi-square and Pearson's correlation coefficient test were performed, as applicable. Protocol was approved by Institutional Review Board, BSMMU, Shahbag, Dhaka.

Inclusion Criteria

- Age range 25-45 years.
- Psoriatic patients diagnosed by the physicians of Dermatology and Venereology.
- Psoriatic patients under treatment with Topical (eg. Corticosteroid cream/ointment, Coal Tar, Dithranol, Tazarotene, VitaminD₃ etc.) therapy, PUVA therapy and Methotrexate medication.

Exclusion Criteria

- Other type of dermatological disorders.

- History of any type of smoking (Cigarettes, Hookah, Biri, Tobacco etc).
- Patients with acute or chronic lung & chest wall disease e.g. Pneumonia, Tuberculosis, Asthma, COPD, Malignancy etc.

RESULTS

The results are shown in Table I and Figure 1. The mean \pm SE age were 33.5 ± 1.424 , 34.5 ± 1.401 , and 35.27 ± 1.44 and 34.8 ± 1.212 years in group A, B₁, B₂ and B₃ respectively and ranging from 25 to 45 years. All the values were almost similar and the differences among the groups were statistically non-significant. Therefore, all the groups were matched for age. The results are shown in Table I and Figure 1. The mean \pm SE BMI were 23.557 ± 0.584 , 23.089 ± 0.721 , 23.986 ± 0.579 and 23.155 ± 0.595 years in group A, B₁, B₂ and B₃ respectively. The results are shown in Table II, IV and Figure 2, 4. The mean \pm SE score of socioeconomic status were 2 ± 0.203 , 1.9 ± 0.175 , 1.967 ± 0.189 and 1.833 ± 0.192 in group A, B₁, B₂ and B₃ respectively. The mean score difference of socioeconomic status in all the groups of the subjects were not statistically significant. Therefore, all the groups were matched for socioeconomic status. The results are shown in Table III, IV and Figure 3, 4. The mean \pm SE score of occupation were 2.7 ± 0.167 , 2.8 ± 0.139 , 2.267 ± 0.166 and 2.467 ± 0.142 in group A, B₁, B₂ and B₃ respectively. The results are shown in Table V and Figure 5. The mean \pm SE predicted value of FVC was 2.651 ± 0.045 liter, measured value was 2.314 ± 0.04 liter and the percentage of predicted value was 87.2 ± 1.096 percent in control group (A). The mean \pm SE predicted value of FVC were 2.662 ± 0.037 , 2.659 ± 0.048 , 2.59 ± 0.044 liters, measured values were 2.284 ± 0.067 , 2.22 ± 0.068 , 1.887 ± 0.053 liters and the percentage of predicted values were 85.8 ± 1.92 , 83.2 ± 1.96 , 72.6 ± 1.207 percent in study group B₁, B₂ and B₃ respectively. In this study, the mean percentages of predicted values of

FVC were significantly ($p\leq 0.001$) different among the groups. Again, the mean percentages of predicted values of FVC were lower in all the study groups in comparison to that of A and the difference was statistically significant ($p\leq 0.001$) in group B₃ compared to A. Moreover, the mean percentage of predicted value of FVC was non-significantly lower in B₂ compared to that of B₁. In addition, this value was significantly lower in group B₃ ($p\leq 0.001$) in comparison to group B₁ and B₂. The results are shown in Table VI and Figure 6. The mean \pm SE of predicted values of FEV₁ were 2.16 ± 0.041 , 2.21 ± 0.039 , 2.218 ± 0.049 and 2.105 ± 0.044 liters, measured values were 1.956 ± 0.043 , 2.02 ± 0.073 , 1.94 ± 0.065 and 1.59 ± 0.056 liters and percentage of predicted values were 90.37 ± 0.946 , 90.97 ± 2.371 , 87.2 ± 2.112 and 74.27 ± 1.382 percent in group A, B₁, B₂ and B₃ respectively. Again, the mean percentages of predicted values of FEV₁ were lower in group B₂ and B₃. Slightly higher in group B₁ in comparison to that of A and the difference was statistically significant ($p\leq 0.001$) in B₃ compared to A. Moreover, these values were significantly ($p\leq 0.001$) lower in group B₃ in comparison to that of B₁ and B₂. The results are shown in Table VII and Figure 7. The mean \pm SE of predicted values of FEV₁/FVC ratio were 81.29 ± 0.403 , 82.76 ± 0.568 , 82.37 ± 0.547 , and 82.09 ± 0.653 percent, measured values were 84 ± 0.98 , 87.6 ± 1.039 , 86 ± 0.99 and 83.07 ± 0.823 percent and percentage of predicted values were 103 ± 0.996 , 106 ± 0.958 , 105 ± 0.885 , and 101.2 ± 0.688 in group A, B₁, B₂ and B₃ respectively. In this study, the differences of the mean percentage of predicted values of these variables among the groups were statistically significant ($p\leq 0.01$). Moreover, the mean percentage of predicted values of FEV₁/FVC ratio was significantly lower in group B₃ in comparison to group B₁ ($p\leq 0.001$) and B₂ ($p\leq 0.01$). In addition, the value was non-significantly lower in group B₂ compared to B₁.

Table-1: Age and BMI in different groups (n=120)

Groups	n	Age (Year)	BMI (Kg/m ²)
A	30	33.5 ± 1.424 (25-45)	23.557 ± 0.584 (18.256-28.515)
B1	30	34.5 ± 1.401 (25-45)	23.089 ± 0.721 (17.527-31.53)
B2	30	35.27 ± 1.44 (25-45)	23.986 ± 0.579 (17.578-29.615)
B3	30	34.8 ± 1.212 (25-45)	23.155 ± 0.595 (17.968-31.163)

In this study, all the groups (healthy and diseased) were matched for BMI, as the values were almost similar and the differences among the groups were statistically non-significant.

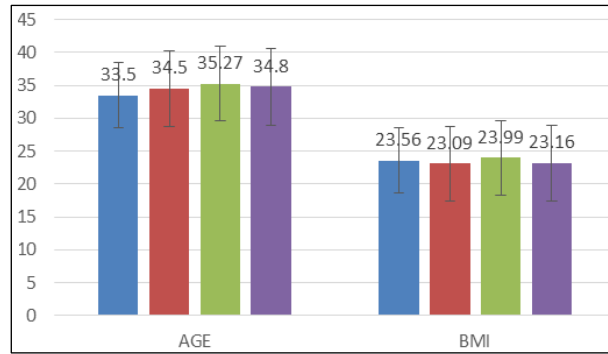


Fig-1: Mean Age and BMI in different groups (n=120)

Table-2: Frequency distribution of all subjects by socioeconomic status (in percentage) in different groups (n=120)

Monthly income (Taka)	Score	Groups							
		A		B1		B2		B3	
		F	%	F	%	F	%	F	%
6800-9000	1	15	50	13	43.333	12	40	16	53.333
9001-11000	2	3	10	9	30	11	36.666	6	20
11001-13000	3	9	30	6	20	3	10	5	16.666
13001-15000	4	3	10	2	6.666	4	13.333	3	10
Total		30	100	30	100	30	100	30	100

In this study, all the groups (healthy and diseased) were matched for occupation, as the mean score differences among the groups were statistically non-significant

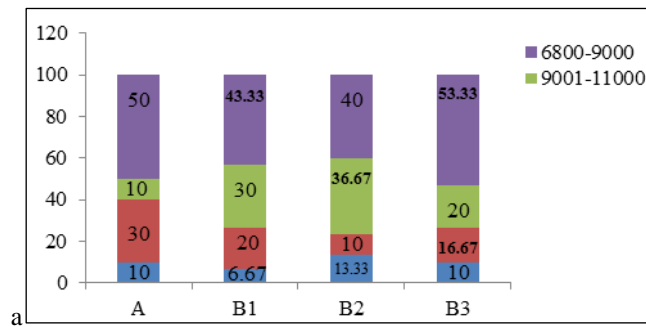


Fig-2: Frequency distribution of all subjects by socioeconomic status (in percentage) in different groups (n=120)

Table-3: Frequency distribution of all subjects by occupation (in percentage) in different groups (n=120)

Monthly income (Taka)	Score	Groups							
		A		B1		B2		B3	
		F	%	F	%	F	%	F	%
Dependent	1	3	10	2	6.666	7	23.333	3	10
Businessman	2	9	30	6	20	10	33.333	12	40
Service Holder	3	12	40	18	60	11	36.666	13	43.333
Day labor	4	6	20	4	13.333	2	6.666	2	6.666
Total		30	100	30	100	30	100	30	100

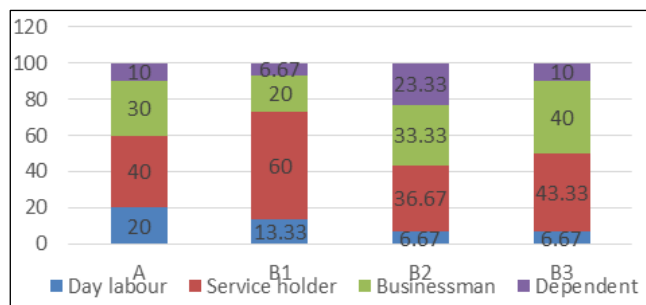


Fig-3: Frequency distribution of all subjects by occupation (in percentage) in different groups (n=120)

Table-4: Socioeconomic status and occupation in different groups (n=120)

Groups	n	Socioeconomic Status (Score)	Occupation (Score)
A	30	2±0.203 (1-4)	2.7±0.167 (1-4)
B1	30	1.9±0.175 (1-4)	2.8±0.139 (1-4)
B2	30	1.967±0.189 (1-4)	2.267±0.166 (1-4)
B3	30	1.833±0.192 (1-4)	2.467±0.142 (1-4)

Data were expressed as mean ±SE. Figures in parentheses indicate ranges. ε = Chi-square test (χ²).

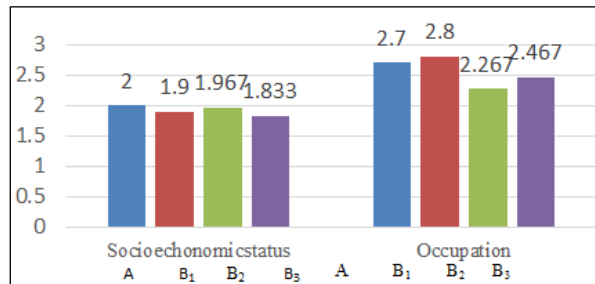


Fig-4: Mean socioeconomic status and occupation in different groups (n=120)

Table-5: FVC of Psoriatic patients taking different drugs (n=120)

Groups	Predicted value (liters)	Measured value (liters)	Percentage of predicted value (%)
A	2.651±0.045 (2.26-3.35)	2.314±0.0404 (1.85-2.76)	87.2±1.096 (80-103)
B1	2.662±0.037 (2.25-3.15)	2.284±0.067 (1.76-3.03)	85.8±1.92 (67-102)
B2	2.659±0.048 (2.25-3.35)	2.22±0.068 (1.67-2.84)	83.2±1.96 (67-102)
B3	2.59±0.044 (2.09-3.01)	1.887±0.053 (1.46-2.58)	72.6±1.207 (63-87)

Data were expressed as mean ±SE. Figures in parenthesis indicate ranges. φ = independent sample ‘t’ test, Ω = one-way ANOVA test

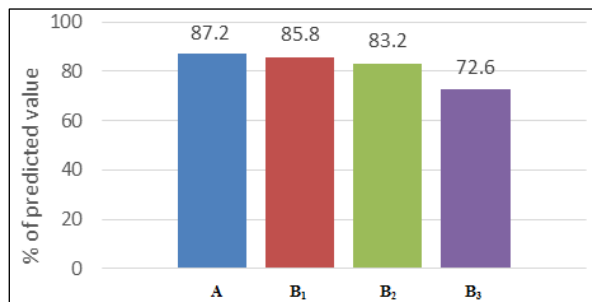


Fig-5: Mean percentage of predicted value of FVC in different groups (n=120)

Table-6: FEV₁ of Psoriatic patients taking different drugs (n=120)

Groups	Predicted value (liters)	Measured value (liters)	Percentage of predicted value (%)
A	2.16±0.041 (1.76-2.82)	1.956±0.043 (1.55-2.55)	90.37±0.946 (78-108)
B1	2.21±0.039 (1.78-2.71)	2.02±0.073 (1.35-2.8)	90.97±2.371 (72-110)
B2	2.218±0.049 (1.85-2.95)	1.94±0.065 (1.49-2.57)	87.2±2.112 (70-111)
B3	2.105±0.044 (1.63-2.58)	1.59±0.056 (1.19-2.32)	74.27±1.382 (65-93)

In this study, the mean percentages of predicted values of FEV₁ were significantly (p<0.001) different among the groups. In addition, the value was statistically non-significant in B₂ compared to B₁.

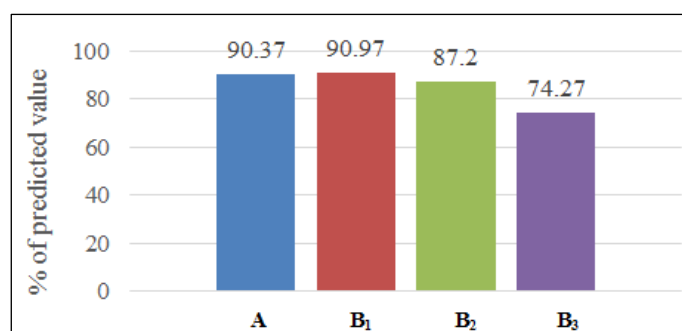


Fig-6: Mean percentage of predicted value of FEV₁ in different groups (n=120)

Table-7: FEV₁/FVC % of Psoriatic patients taking different drugs (n=120)

Groups	Predicted value (%)	Measured value (%)	Percentage of predicted value (%)
A	81.29±0.403	84±0.98	103±0.996
(n=30)	(77.53-85.02)	(69-93.1)	(89-110)
B ₁	82.76±0.568	87.6±1.039	106±0.958
(n=30)	(76.89-87.07)	(72.8-100)	(88-115)
B ₂	82.37±0.547	86±0.99	105±0.885
(n=30)	(77.41-86.96)	(75-98)	(91-115)
B ₃	82.09±0.653	83.07±0.823	101.2±0.688
(n=30)	(77.41-86.67)	(73.84-91.92)	(91-108)

the mean percentage of predicted values of FEV₁/FVC ratio were higher in B₁ and B₂ study groups, but lower in B₃ study group in comparison to that of control (A). However, these differences were not statistically significant.

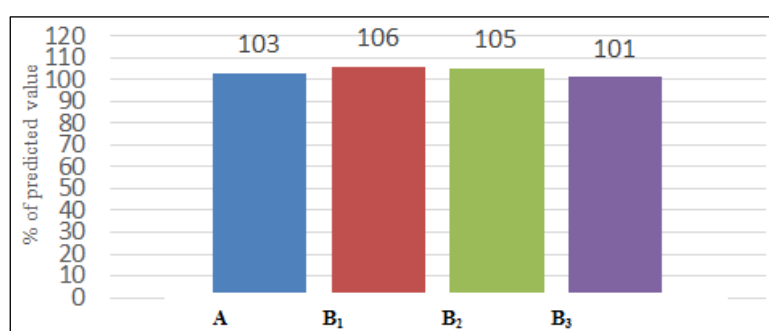


Fig-7: Mean percentage of predicted value of FEV₁/FVC % in different groups (n=120)

DISCUSSION

The present study has been undertaken to observe some aspects of spirometry pulmonary function in diagnosed male psoriatic patients after Topical, PUVA, and Methotrexate therapy in order to evaluate their pulmonary function status. Therefore, pulmonary function were assessed by measuring FVC, FEV₁, FEV₁/FVC (%), PEF_R, FEF_{25-75%}, FEF_{25%}, FEF_{50%} and FEF_{75%} with a spirometer. All these variables were also studied in apparently healthy age, BMI, socioeconomic status and occupation matched male subjects for comparison. In this study, values of lung function variables of healthy subjects were within normal limit and were almost similar to those reported by different investigators abroad (Selby, Friedman and Queensberry 1989; Jun et al.2005). Again, both the groups (control and study) were comparable, as there was no significant difference in the confounding variables such as age, BMI, socioeconomic status and occupation, between two groups. However, to exclude

the effect of age and BMI on the values of different spirometry variables, measured value as percentage of predicted values were used for analysis. In this study, the mean percentages of predicted values of FVC in different group of Psoriatic patients were lower than those of healthy subjects. Moreover, this variable was not significantly ($p>0.05$) lower in those groups of Psoriatic patients treated either by only topical or PUVA therapy when compared to control subjects. Again, this variable was significantly ($p<0.001$) lower in that group of Psoriatic patients treated by Methotrexate therapy when it was compared to control subjects. Almost similar types of findings were reported by some investigators^{24,27}. In this study, the mean percentages of predicted values of FEV₁ were lower in those groups of Psoriatic patients taking PUVA or Methotrexate therapy than those of control subjects. On the other hand, this variable was slightly higher in those Psoriatic patients receiving topical therapy in comparison to that of control. However, this variable was not significantly ($p>0.05$) lower in those groups of

Psoriatic patients treated either by only topical or PUVA therapy when compared to control subjects. No similar observation was available for comparison. Again, this parameter was significantly ($p < 0.001$) lower in that group of Psoriatic patients treated by Methotrexate therapy when it was compared to control subjects. Almost similar types of findings were reported by some investigators^{24,27}. The mean percentages of predicted values of FEV₁/FVC % were not significantly ($p > 0.05$) higher in those group of Psoriatic patients taking Topical or PUVA therapy when compared to control group. On the other hand, this variable was non-significantly lower in those Psoriatic patients taking Methotrexate therapy in comparison to control. No similar observation was available for comparison. No similar observation was available for comparison.

LIMITATIONS OF THE STUDY

It was a cross-sectional type study with small sample size, which doesn't reflect the scenario of the whole country.

CONCLUSION AND RECOMMENDATIONS

From this cross sectional study, it may be concluded that, the spirometry variables may decrease more in male psoriatic patients after methotrexate medication in comparison to topical or PUVA therapy. These decrement may be associated with silent pulmonary disorders. Psoriatic patients are commonly affected by restrictive type of pulmonary disorder. To be more conclusive the following recommendations are proposed for further studies: Prospective type of study can be done in newly diagnosed Psoriatic patients and after 6 months of Methotrexate therapy. Similar type of study can be done with large sample size and also in female Psoriatic patients.

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