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# Efficacy and Tolerability of Peginterferon alpha-2a and Peginterferon alpha-2b in Iranian Patients With Chronic Hepatitis C

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**Abstract**

**Background:** Nearly 0.5% of Iranians are infected with HCV. Peginterferon-alpha-2a and Peginterferon-alpha-2b are the two available types of interferon for the treatment of hepatitis C. Comparing the results of these two treatments is still a challenge.

**Objectives:** The aim of this study was to compare the results of Peginterferon-alpha-2a and Peginterferon-alpha-2b in Iranian patients with chronic hepatitis C.

**Patients and Methods:** 289 patients with chronic hepatitis C attending Tehran Hepatitis Center (THC) and Hepatitis Clinic of Tehran Blood Transfusion Organization (TBTO) from January 2008 to April 2013 and treated with combination of Peginterferon-alpha-2a or Peginterferon-alpha-2b plus Ribavirin were enrolled in this retrospective cross-sectional study. Treatment response and side effects were compared.

**Results:** Among all naive patients, 82.0% achieved SVR, 5.4% were resistant to therapy and 11.0% withdrew the treatment. Relapse was seen in 12.2% of naive patients who finished the course of treatment. RVR and EVR were seen in 67.7% and 90.6% of naive patients, respectively. Patients divided into two groups. Group A consists of 247 patients treated with Peginterferon-alpha-2a and group B 42 patients treated with Peginterferon-alpha-2b. No significant difference in treatment response was observed between naive patients of the two groups. The rates of arthralgia/myalgia, alopecia, pruritus, insomnia, dyspnea and anorexia were higher in group A and the rates of dermal problems, coryza and bleeding were higher in group B. In a subgroup analysis, the two kinds of Peginterferon-alpha-2a available in Iran were compared. Rapid and early viral responses and relapse rates were lower in the one made in Iran and the long-term responses were not different. The rates of arthralgia/myalgia, fever, alopecia, pruritus, insomnia, dyspnea, anorexia, cough, headache and abdominal pain were higher and the rates of irritability and coryza were lower in the one made in Iran.

**Conclusions:** There was no significant difference in the efficacy of Peginterferon-alpha-2a and Peginterferon-alpha-2b in Iranian patients. Physicians might choose the treatment regimen for every individual concerning the differences in side effects of Peginterferons.

*Keywords:* Hepatitis C, Iran, Peginterferon alfa-2a, Peginterferon alfa-2b

## 1. Background

As a crucial cause of cirrhosis and hepatocellular carcinoma, hepatitis C infected around 140 million individuals worldwide leading to over 350000 deaths every year (1). Nearly 0.5 % of Iranians are infected with HCV since it is the second major liver disease in Iran after Hepatitis B (2).

The recommended treatment combination for chronic hepatitis C infection is Pegylated-Interferon-alpha (Peginterferon-alpha) plus Ribavirin (RBV) for 24 to 72 weeks (3). Although recently, more effective treatments for chronic hepatitis C have been introduced, high cost of these treatments made Peginterferon-alpha plus RBV combination the only affordable treatment option in many developing countries (4-6).

Peginterferon-alpha-2a and Peginterferon-alpha-2b the two available types of Interferon for hepatitis C, differ in their pharmacokinetics and chemical properties (3). According to duration, side effects and cost of treatment, it is reasonable to know which drug responds better. In published articles, there are several observations with these two drugs; some claim Peginterferon-alpha-2a has better outcome and many others declare no difference (7-16). There is no published article comparing these therapies in Iranian patients. Considering the impact of race and genetics on the result of therapy, we performed the present study to determine the effi-

cacy of Peginterferon-alpha-2a plus RBV in comparison with Peginterferon-alpha-2b plus RBV for the treatment of chronic hepatitis C in Iranian patients (17).

## 2. Objectives

The goal of this study was to compare the efficacy and tolerability of Peginterferon-alpha-2a and Peginterferon-alpha-2b in combination with RBV for the treatment of hepatitis C in Iranian patients.

## 3. Patients and Methods

Patients with chronic hepatitis C attended Tehran Hepatitis Center (THC) and Hepatitis Clinic of Tehran Blood Transfusion Organization (TBTO) from January 2008 to April 2013 treated with Peginterferon-alpha plus RBV enrolled in this retrospective cross-sectional study. TBTO and THC are two major referral centers for diagnosis and treatment of infectious liver diseases in Iran.

The exclusion criteria were co-infection of hepatitis B virus or Human Immunodeficiency Virus (HIV), decompensated liver disease, Hepatocellular Carcinoma (HCC), liver transplantation, creatinine clearance less than 50 mL/minute, poorly controlled diabetes mellitus, poorly controlled psychiatric disease, malignant neoplastic disease, severe cardiac or chronic pulmonary disease, immunologically mediated disease, thalassemia, hemochromatosis, retinopathy or active substance abuse.

Two types of Peginterferon-alpha are suitable for management of chronic hepatitis C in combination with RBV. Peginterferon-alpha-2a with the trade names Pegasys® (Roche, Switzerland) in combination with Copegus® (Ribavirin, Roche, Switzerland) and Pegaferon® (Pooyesh Darou, Iran) in combination with Ribabiovir® (Ribavirin, Bakhtar Bioshimi, Iran) and Peginterferon-alpha-2b with the trade name Pegintron® (Merck, USA) in combination with Rebetol® (Ribavirin, Merck, USA) are available in Iran.

The protocol of therapy consists of weekly subcutaneous injection of 180 μg of Peginterferon-alpha-2a (Pegasys®/Pegafron®) or 1.5 μg per kg body weight of Peginterferon-alpha-2b (Pegintron®), plus daily oral administration of RBV, 1000 - 1200 mg based on body weight below or over 75 kg in genotype 1 or 4 for 48 to 72 weeks and 800 mg in genotype 2 or 3 for 24 to 48 weeks.

Routine visits scheduled during the course of treatment and signs and symptoms of disease, treatment adverse effects and laboratory data checked at each visit. To explore the efficacy of therapy, the treatment response evaluated by parameters based on HCV RNA levels in patients' sera. HCV RNA levels assessed using COBAS® Taqman® HCV Test v2.0 (Roche Diagnostics, Switzerland) with a detection limit of 10 IU/mL. The treatment response parameters were 'sustained viral response' (SVR), 'resistance', 'relapse', 'withdrawal', 'rapid viral response' (RVR) and 'early viral response' (EVR). RVR and EVR were defined as the absence of HCV RNA in patient's serum within 4 weeks and 12 weeks of the initiation of therapy, respectively. A decrease of less than 2 log 10 IU/mL from baseline of HCV RNA level at week 12 or a detectable HCV RNA level both at week 24 and after that, the treatment course considered as resistance. SVR was defined as the absence of HCV RNA, 24 weeks after treatment completion. Relapse was defined as reappearance of HCV RNA within 24 weeks after treatment completion and before achieving the SVR. Withdrawal means elimination of treatment before finishing the course of therapy, which may be due to resistance or drugs' adverse effects or even patient's poor cooperation.

Erythropoietin and granulocyte colony stimulating factor (GCSF) were applied if the patients' hemoglobin level or Neutrophil counts decreased under 7 g/dL or 500/mL, respectively. Gathered data analyzed by SPSS® 18 for windows software (SPSS Inc. Chicago, Illinois, USA). A P value less than 0.05 considered as significant. Patients noticed about using their medical information for scientific research and informed consent was obtained.

## 4. Results

Three hundred thirty three patients were included in the beginning, 44 patients were excluded based on the exclusion criteria or due to lack of discipline in taking medications or laboratory tests. At last, 289 patients were enrolled in this study, 240 (83%) were male and 49 (17%) female. Mean age of patients was 38.8 (± 12.8) years.

Genotypes 1, 2, 3 and 4 were found in 168 (58.5%), 2 (0.7%), 107 (37.3%) and 1 (0.3%) patients, respectively and 8 (2.8%) patients had mixed genotypes. 263 (91.0%) patients were treatment naive and 26 (9.0%) patients were treatment-experienced who did not achieve SVR because of relapse, resistance, side effects or incompliance in the past.

Patients divided into two groups based on the treatment regimen. Group A consists of 247 (85.5%) patients treated with Peginterferon-alpha-2a and group B 42 (14.5%) patients treated with Peginterferon-alpha-2b.

Demographic information of the two groups is available in Table 1. Between them, gender distribution was the only variable different between the two groups. The gender distribution is different in the two groups, but we need to show this difference did not influence our results. Table 2 is just to show that, the existence of this difference (in gender distribution of the two groups), is incapable to influence the results of the comparison between response parameters.

Comparison of treatment response parameters between naive patients of the two groups is shown in Table 3 ; to reduce the influence of undesired variables, this comparison performed between naive patients.

Thirty eight (13.1%) patients withdrew the treatment, 13 of them due to resistance, 11 due to adverse effects, and the rest due to incompliance. Twenty nine (76.3%) of them were naive and 9 (23.7%) treatment-experienced. Naive patients had more chance to finish the course of treatment (P < 0.01, Pearson Chi-Square).

Among naive patients, 82.0% achieved SVR, 5.4% were resistant to therapy and 11.0% withdrew the treatment. Relapse was observed in 12.2% of naive patients who finished the course of treatment. RVR and EVR were seen in 67.7% and 90.6% of naive patients, respectively.

Among all patients, Peginterferon-alpha and RBV dosage decreased in 16 (5.5%) and 23 (8.0%) patients, respectively due to adverse effects. Peginterferon-alpha dosage was reduced in 3.5% and 17.1% of group A and B naive patients, respectively (P < 0.01, Pearson Chi-Square). Eighteen (6.2%) patients received Erythropoietin and 8 (2.8%) patients GCSF. Comparison of side effects between the two groups is shown in Table 4.

In a subgroup analysis, patients of group A divided into two subgroups. Subgroup A1 and subgroup A2, treated with the two kinds of Peginterferon-alpha-2a, Pegasys® and Pegaferon®, plus RBV, respectively. Comparison of response parameters between these two subgroups is shown in Table 5 and comparison of side effects of these two treatments is shown in Table 6.

**Table 1.** Demographic Information of All Participants[a]

| | Group A [b] | Group B [b] | P Value |
|---|---|---|---|
| **Number (Naive/All)** | 228/247 (92.3) | 35/42 (83.3) | 0.06 [c] |
| **Gender** | | | < 0.01 [c] |
| Male | 211/247 (85.4) | 29/42 (69.0) | |
| Female | 36/247 (14.6) | 13/42 (31.0) | |
| **HCV Genotype** | | | 0.16 [d] |
| 1 | 140/236 (59.3) | 28/39 (71.8) | |
| 3 | 96/236 (40.7) | 11/39 (28.2) | |
| **RS-12979860** | | | 0.27 [d] |
| CC | 72/208 (34.6) | 18/37 (48.6) | |
| CT | 103/208 (49.5) | 14/37 (37.0) | |
| TT | 33/208 (15.) | 5/37 (13.5) | |
| **RS-8099917** | | | 0.61 [d] |
| GG | 6/159 (3.8) | 0/21 | |
| GT | 67/159 (42.1) | 7/21 (33.3) | |
| TT | 86/159 (54.1) | 14/21 (66.7) | |
| **Mean Start Age [e,f]** | 39.2 ± 13.0 | 37.7 ± 12.3 | 0.54 [g] |
| **Mean Treatment Duration [h]** | 38.7 ± 16.2 | 42.4 ± 19.4 | 0.23 [g] |
| **Mean Baseline Viral Load [i]** | 3117.571 ± 6253.933 | 1686.175 ± 3401.193 | 0.80 [g] |

[a]Group A treated with Peginterferon-alpha-2a and Group B treated with Peginterferon-alpha-2b both in combination with Ribavirin.
[b]Data are presented as No. of cases/No. of all. (%).
[c]Pearson Chi-Square.
[d]Fisher's Exact test.
[e]Values are presented as Mean ± SD.
[f]Years.
[g]Mann-Whitney U test.
[h]Weeks.
[i]10

**Table 2.** Adjusted OR for Study Variable With Control of Gender in Logistic Regression Between Groups A and B[a,b]

| | OR | CI (95%) | P Value |
|---|---|---|---|
| **RVR** | 0.75 | 0.37 - 1.51 | 0.42 |
| **EVR** | 0.66 | 0.24 - 1.78 | 0.41 |
| **SVR** | 1.57 | 0.55 - 4.51 | 0.40 |
| **Resistance** | 0.97 | 0.25 - 3.43 | 0.91 |
| **Relapse** | 0.46 | 0.10 - 2.12 | 0.32 |
| **Withdrawal** | 1.10 | 0.42 - 2.86 | 0.84 |

[a]Abbreviations: CI (95%), 95% Confidence Interval; EVR, Early Viral Response; OR, Odds Ratio; RVR, Rapid Viral Response; SVR, Sustained Viral Response.
[b]Group A treated with Peginterferon-alpha-2a and Group B treated with Peginterferon-alpha-2b both in combination with Ribavirin.

**Table 3.** Comparison of Response Parameters Between Group A and Group B Naive Patients[a,b]

| | Total c | Group A [c] | Group B [c] | OR (CI 95%) [d] | P Value |
|---|---|---|---|---|---|
| **RVR** | 168/248 (67.7) | 147/214 (68.7) | 21/34 (61.8) | 1.36 (0.64 - 2.87) | 0.42 [e] |
| **EVR** | 231/255 (90.6) | 201/220 (91.4) | 30/35 (85.7) | 1.76 (0.61 - 5.07) | 0.29 [e] |
| **SVR** | 173/211 (82.0) | 150/184 (81.5) | 23/27 (85.2) | 0.77 (0.25 - 2.36) | 0.79 [f] |
| **Resistance** | 14/261 (5.4) | 12/226 (5.3) | 2/35 (5.7) | 0.93 (0.20 - 4.32) | 0.92 [e] |
| **Relapse** | 24/197 (12.2) | 22/172 (12.8) | 2/25 (8.0) | 1.69 (0.37 - 7.66) | 0.75 [f] |
| **Withdrawal** | 29/263 (11.0) | 25/228 (11.0) | 4/35 (11.4) | 0.95 (0.31 - 2.93) | 0.94 [e] |

[a]Abbreviations: EVR, Rapid Viral Response; RVR, Rapid Viral Response; SVR, Sustained Viral Response.
[b]Group A treated with Peginterferon-alpha-2a and Group B treated with Peginterferon-alpha-2b both in combination with Ribavirin.
[c]Data are presented as No. of cases/No. of all. (%).
[d]Odds Ratio of Group A/Group B (95% Confidence Interval).
[e]Pearson Chi-Square.
[f]Fisher's Exact test.

**Table 4.** Comparison of Side Effects Between Group A and Group B Patients[a]

| | Total [b] | Group A [b] | Group B [b] | OR (CI 95%) [c] | P Value |
|---|---|---|---|---|---|
| **Arthralgia, Myalgia** | 135/289 (46.7) | 124/247 (50.2) | 11/42 (26.2) | 2.84 (1.37 - 5.91) | < 0.01 [d] |
| **Alopecia** | 98/289 (33.9) | 91/247 (36.8) | 7/42 (16.7) | 2.92 (1.24 - 6.84) | 0.01 [d] |
| **Pruritus** | 90/289 (31.1) | 83/247 (33.6) | 7/42 (16.7) | 2.53 (1.08 - 5.94) | 0.03 [d] |
| **Insomnia** | 85/289 (29.4) | 81/247 (32.8) | 4/42 (9.5) | 4.64 (1.60 - 13.43) | < 0.01 [d] |
| **Dyspnea** | 74/289 (25.6) | 70/247 (28.3) | 4/42 (9.5) | 3.76 (1.29 - 10.92) | 0.01 [d] |
| **Anorexia** | 64/289 (22.1) | 64/247 (25.9) | 0/42 | 29.88 (1.81 - 492.56) [e] | < 0.01 [d] |
| **Dermal Problems [f]** | 22/289 (7.6) | 12/247 (4.9) | 10/42 (23.8) | 0.16 (0.07 - 0.41) | < 0.01 [g] |
| **Coryza** | 22/289 (7.6) | 12/247 (4.9) | 10/42 (23.8) | 0.16 (0.07 - 0.41) | < 0.01 [g] |
| **Bleeding [h]** | 9/289 (3.1) | 5/247 (2.0) | 4/42 (9.5) | 0.20 (0.50 - 0.76) | 0.01 [g] |

[a]Group A treated with Peginterferon-alpha-2a and Group B treated with Peginterferon-alpha-2b both in combination with Ribavirin.
[b]Data are presented as No. of cases / No. of all. (%).
[c]Odds Ratio of Group A/Group B (95% Confidence Interval).
[d]Fisher's Exact test.
[e]Cornfield's Corrected Odds Ratio of Subgroup A1/Subgroup A2 (95% Confidence Interval).
[f]Dermal Problems consist of Dry Skin, Rash, Dermatitis and Induration.
[g]Pearson Chi-Square.
[h]Bleeding consists of Gum Bleeding, Epistaxis, Hemoptysis, Hematemesis, Hematochezia, Melena, and Menorrhagia.

**Table 5.** Comparison of Response Parameters Between Subgroup A1 and Subgroup A2 Naive Patients[a,b]

| | Subgroup A1 [c] | Subgroup A2 [c] | OR (CI 95%) [d] | P Value |
|---|---|---|---|---|
| **RVR** | 63/81 (77.8) | 80/127 (63.0) | 2.06 (1.09 - 3.88) | 0.03 [e] |
| **EVR** | 80/82 (97.6) | 116/132 (87.9) | 5.52 (1.23 - 24.66) | 0.01 [e] |
| **SVR** | 46/59 (78.0) | 103/122 (84.4) | 0.65 (0.30 - 1.43) | 0.29 [f] |
| **Resistance** | 2/86 (2.3) | 9/134 (6.7) | 0.33 (0.07 - 1.57) | 0.21 [e] |
| **Relapse** | 11/57 (19.3) | 10/113 (8.8) | 2.46 (0.98 - 6.21) | 0.05 [f] |
| **Withdrawal** | 8/86 (9.3) | 15/136 (11.0) | 0.83 (0.34 - 2.04) | 0.82 [e] |

[a]Abbreviations: EVR, Early Viral Response; RVR, Rapid Viral Response; SVR, Sustained Viral Response.
[b]Subgroup A1 treated with Pegasys® and Subgroup A2 treated with Pegaferon® both in combination with Ribavirin.
[c]Data are presented as No. of cases/No. of all. (%).
[d]Odds Ratio of Subgroup A1/Subgroup A2 (95% Confidence Interval).
[e]Fisher's Exact test.
[f]Pearson Chi-Square.

**Table 6.** Comparison of Side Effects Between Subgroup A1 and Subgroup A2 Patients[a]

| | Subgroup A1 [b] | Subgroup A2 [b] | OR (CI 95%) [c] | P Value |
|---|---|---|---|---|
| **Arthralgia, Myalgia** | 26/99 (26.3) | 97/142 (68.3) | 0.17 (0.09 - 0.29) | < 0.01 [d] |
| **Fever** | 32/99 (32.3) | 82/142 (57.7) | 0.349 (0.20 - 0.60) | < 0.01 [d] |
| **Alopecia** | 14/99 (14.1) | 77/142 (54.2) | 0.14 (0.07 - 0.27) | < 0.01 [d] |
| **Pruritus** | 14/99 (14.1) | 68/142 (47.9) | 0.18 (0.09 - 0.34) | < 0.01 [d] |
| **Insomnia** | 10/99 (10.1) | 71/142 (50.0) | 0.11 (0.05 - 0.23) | < 0.01 [d] |
| **Dyspnea** | 12/99 (12.1) | 57/142 (40.1) | 0.21 (0.10 - 0.41) | < 0.01 [d] |
| **Anorexia** | 0/99 | 64/142 (45.1) | 0.01 (0.00 - 0.10) [e] | < 0.01 [d] |
| **Cough** | 11/99 (11.1) | 49/142 (34.5) | 0.24 (0.12 - 0.49) | < 0.01 [d] |
| **Headache** | 13/99 (13.1) | 44/142 (31.0) | 0.34 (0.17 - 0.67) | < 0.01 [d] |
| **Abdominal pain** | 0/99 | 13/142 (9.2) | 0.05 (0.00 - 0.82) [e] | < 0.01 [d] |
| **Irritability** | 13/99 (13.1) | 0/142 | 44.48 (2.61 - 757.76) [e] | < 0.01 [d] |
| **Coryza** | 10/99 (10.1) | 1/142 (0.7) | 15.84 (1.99 - 125.89) | < 0.01 [d] |

[a] Subgroup A1 treated with Pegasys® and Subgroup A2 treated with Pegaferon® both in combination with Ribavirin.
[b] Data are presented as No. of cases/No. of all. (%).
[c] Odds Ratio of Subgroup A1/Subgroup A2 (95% Confidence Interval).
[d] Fisher's Exact test.
[e] Cornfield's Corrected Odds Ratio of Subgroup A1/Subgroup A2 (95% Confidence Interval).

## 5. Discussion

Hepatitis C is the second major cause of liver diseases in Iran after Hepatitis B (2). Treatment comforts its complications and improves patients' life expectancy (18). Response to therapy varies among populations and various results obtained based on specifications such as virus and host genetics (13, 17). Concerning similarities between this study and Jahanbakhsh Sefidi's epidemiological study over demographic specifications (19) and the majority of TBTO and THC in accepting referred patients from all over the country, this study may represent a proper estimation about response of Iranian patients with chronic hepatitis C to treatment.

The two groups were similar in basic specifications like distribution of virus genotypes and interleukin genotypes. They were also comparable in mean treatment start age, mean treatment duration and also mean baseline viral load. These similarities make the comparison of treatments more reliable. The only demographic variable different between the two groups was gender distribution, which was not effectual on the comparison between the two groups as seen in Table 2.

Among all patients, 9% were treatment-experienced, but among those who withdrew the treatment, nearly 24% were treatment-experienced. This means naive patients have a greater chance to accomplish the course of treatment. This greater chance of naive patients is understandable considering that some of the patients who experienced treatment before had withdrawn the course of treatment because of adverse effects that might occur again. Comparing the efficacy in naive patients helps making the comparison less influenced by undesired factors and more reliable.

In a prospective study on naive patients using Pegaferon® plus RBV, Jabbari et al. (20) reported the rates of RVR, EVR, SVR, resistance, relapse and withdrawal as 63%, 89%, 78%, 11%, 7% and 10%, respectively (20). They reported the SVR rate in a larger group of patients as about 77.8% (21). In a prospective study using Pegasys® plus RBV in Iran, Namazee et al. (22) reported the rates of SVR, resistance and relapse as 50%, 28% and 22%, respectively. Druyts et al. (23) in a meta-analysis reported the rates of EVR, SVR, resistance, relapse and withdrawal as 70%, 58%, 19%, 7% and 23%, respectively (23). The results of the current study were similar to the results of the studies performed by Jabbari et al. (20, 21), but were a little better than the other two studies by Namazee et al. (22) and Druyts et al. (23). This difference may be because those studies reported the results of all patients not just naive patients.

Comparison between Peginterferon-alpha-2a and Peginterferon-alpha-2b had performed in many other studies; El Raziky et al. (7) in a retrospective study, Romero-Gomez et al. (8), Flori et al. (9), Singal et al. (12), Alavian et al. (10) and Awad et al. (11), in their meta-analyses concluded that Peginterferon-alpha-2a has better results.

Some other studies declared no difference. Dogan et al. (13) and McHutchison et al. (14) showed similar SVR rate between the two Peginterferon-alpha types. However, Jin et al. (15) reported similar efficacy of two Peginterferon-alpha types in Korean patients and mentioned the importance of genetic basis of the target group on the result of therapy.

In this study, the rates of all response parameters were similar in both groups as seen in Table 3. This similarity between the results of the two treatment regimens in Iranian patients may support the conclusion of Jin et al. (15) on the importance of genetic pool on the result of treatment.

In the present study, the differences in side effects in groups A and B were few as seen in Table 4. Coryza, dermal problems and bleeding had higher rates in group B and the rates of arthralgia/myalgia, alopecia, pruritus, insomnia, dyspnea and anorexia were higher in group A. Hematologic factors were not significantly different between the two groups.

The resemblance between Peginterferon-alpha-2a and Peginterferon-alpha-2b was mentioned in some previous studies. Rumi et al. (24) mentioned similar safety profile of the two Peginterferon-alpha types. McHutchison et al. (14) reported similar tolerability to both Peginterferon-alpha types in patients. In the study by Jin et al. (15), the only differences between the side effects of Peginterferon-alpha-2a and Peginterferon-alpha-2b were coryza and alopecia, which were more in Peginterferon-alpha-2b and there were no difference in hematologic side effects.

In subgroup analysis between the two subgroups A1 and A2, as shown in Table 5, the rates of SVR, resistance and withdrawal were similar. The rates of RVR and EVR were higher in subgroup A1 in comparison with subgroup A2; but the relapse rate was nighly higher in subgroup A1 either, which made the SVR rate similar in both subgroups. This inconstancy about Pegasys® was reported by Brochot et al. (16) in a survey of 6 other studies showing that Pegasys® had a better response rate at the end of treatment course in comparison with Pegintron®, but as a result of higher relapse rate, the SVR was not higher with Pegasys®. Druyts et al. (23) also mentioned the high rate of relapse with Pegasys® (23). The similar relapse rate between group A and group B in the present study may be due to the similarity between relapse rates of subgroup A2 of group A and group B, which made the whole group A similar to group B. This needs more attention in future studies.

Comparing the two subgroups of A1 and A2 regarding the side effects as shown in Table 6, the rates of arthralgia/myalgia, fever, alopecia, pruritus, insomnia, dyspnea, anorexia, cough, headache and abdominal pain were higher in subgroup A2. In contrary, the rates of irritability and coryza were higher in subgroup A1. There was no significant difference in hematologic side effects between the two subgroups.

There was no comparison between Pegaferon® and other kinds of Peginterferon-alpha in published articles from Iran. The results of two studies published by Jabbari et al. (20, 21) are noted before as the only published articles about Pegaferon®.

In conclusion, the efficacies of Peginterferon-alpha-2a and Peginterferon-alpha-2b in Iranian patients were similar. The efficacy of Pegaferon® made in Iran with a lower cost was similar to Pegasys®. The frequency of side effects was a little different between the medications.

Physicians must select the drug based on the cost and benefits of treatment. This comparison might help physicians to choose suitable drug for each patient. More surveys on larger groups of participants are needed to study favorable and unfavorable effects of Pegaferon® in comparison with other kinds of Peginterferon.

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## Footnotes

**Authors' Contributions:** Seyed Moayed Alavian designed the study. Seyed Moayed Alavian, Maryam Keshvari, Shima Salimi and Leila Mehrnoush contributed to sample collection. Mahdiyar Pouresmaeeli, analyzed the data, Mahdiyar Pouresmaeeli, Moayed Alavian and Maryam Keshvari prepared the manuscript.

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