Analysis of Social Class by LCA in Patients with Schizophrenia: Change in Psychopathology after 12-Month of Treatment

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ÖZET:

Şizofreni hastalarında sosyal sınıf analizi: 12 haftalık tedaviden sonra psikopatolojideki değişim

Amaç: Sosyal etkenler şizofreninin heterojen gidişine katkıda bulunabilir ve bu etkenler ile alınan bakımın düzeyi arasındaki ilişki karmaşıktır. Sosyal etkenler ilaca erişimi ve hastalığın sonlanımlarını etkileyebilir. Güncel tanısal sistemler şizofreninin uzunlamasına gidişini semptom şekillerine göre sınıflar. Bu analizde, IC-SOHO gözlem çalışmasına katılan Türk şizofreni hastalarında latent sosyal sınıfları belirlemeyi amaçladık. Latent sınıf analizi, doktorun günlük pratiğinden kaynaklanan çok heterojen hasta verilerindeki farklı hasta sosyal gruplarını anlamasını mümkün kılabilir.

Yöntem: Antipsikotik tedavi başlanan veya değiştirilen, şizofreni tanısı konulmuş (ICD-10 veya DSM-IV'e göre), 692 poliklinik hastası bu 3 yıllık prospektif gözlem çalışmasına girdi. Barınma şartları (bağımsız, bağımlı, gözetim altında veya hastanede yataklı), çalışma durumu (maaşlı/maaşsız çalışıyor, işsiz ama çalışabilir/ çalışamaz veya emekli), son 4 haftadaki sosyal aktivite sayısı, eşi veya partneri ile ilişkisi dahil sosyal işlevsellikle ilgili bilgiler hastalar ve yakınları ile yapılan görüşme ile toplandı. Sosyal sınıfların belirlenmesi için sosyal işlevsellik göstergelerine dayalı latent sınıf analizi yapıldı.

Tüm hastalar için ve bir yıl boyunca antipsikotik monoterapi alan hastalar için sosyal sınıflar arasında psikopatolojideki ortalama değişikliği karşılaştırdık.

Sonuçlar: 614 hastanın casemix (karışık durum) analizinde kullanılan başlangıç göstergeleri verisi vardı. Sosyal işlevsellik maddeleri bakımından aynı özellikleri paylaşan (benzerlik oranı ki-kare=107.1, df=347) 5 hasta sınıfı belirledik (inaktifler %38.9; sosyal ilişkisi olanlar %29.5; sosyal ilişkisi olmayan işsiz bağımlılar %15.3; ilişkisi olmayan çalışan bağımlılar %11.6; sosyal ilişkisi olmayan emekliler %4.8). Bir yıllık doğal izlemin sonunda pozitif, negatif ve genel semptom şiddetinde iyileşmede sosyal sınıflar arasında istatistiksel fark yoktu.

Tartışma: Sosyal işlevselliğin kategorik modellenmesi, şizofreni hastalarında sınıfların daha ileri araştırılması için basit ve geçerli bir araç olabilir. Farklı tedavilerin uzun dönemli etkinliğinin kavramsal gruplarda değerlendirilmesi, şizofreni hastalarının işlevsellik sonlanımları hakkında çok değerli bilgiler sağlayabilir.

Anahtar sözcükler: Şizofreni, sosyal sınıflar, antipsikotikler, latent sınıf analizi, karışık durum (casemix)

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ABSTRACT:

Analysis of social class by LCA in patients with schizophrenia: change in psychopathology after 12-month of treatment

Objective: The social factors may contribute to the heterogeneous course of schizophrenia and relationship between these factors and the level of care received is complex. Social factors may influence access to treatment and outcome of the disease. Current diagnostic systems classify longitudinal course of schizophrenia based on symptom patterns. We aimed to identify latent social classes in Turkish patients with schizophrenia who participated to IC-SOHO observational study. Latent class analysis may allow a physician to understand various patient social groups (social casemix) in a very heterogeneous patient data flow seen in everyday practice.

Method: 692 outpatients with schizophrenia (ICD-10 or DSM-IV), who were initiated or switched to antipsychotic treatment, were included in this 3-year, non-interventional, prospective, observational study. Information regarding social functioning items including housing (independent, dependent, supervised, or hospitalized), work status (employed paid/unpaid, unemployed able to work/unable to work, or retired), number of social activities in past 4 weeks, and relationship with spouse or partner, were collected by interviewing the patients and relatives. We performed a latent class analysis acording to patient's indicators of social functioning to identify social classes.

We compared mean change of psychopathology among social classes for all patients and for patients treated with antipsychotic monotherapy for one year.

Results: Data for baseline indicators used in the casemix analysis were available for 614 patients. We identified 5 classes of patients (inactives, 38.9%; in a relationship, 29.5%; no relationship unemployed dependents, 15.3%; no relationship employed dependents, 11.6%; no relationship retirees, 4.8%) that share similar characteristics, (likelihood ratio chi-square=107.1, df=347) with 4 aspects of social functioning items. There was no statistical difference among social classes in the improvement of positive, negative, and overall symptom severity at the end of one year naturalistic follow-up. CGI-S score decreases from baseline for positive symptoms were significantly higher with atypical antipsychotics when compared to typicals.

Conclusion: The categorical modeling of social functioning may be a simple and valid tool for the further exploration of the classes in schizophrenia patients. Testing for long-term efficacy of different treatments in the putative groups may provide valuable insight for functional outcomes of patients with schizophrenia.

Key words: Schizophrenia, social class, antipsychotic, latent class analysis

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INTRODUCTION

Schizophrenia presents a rather heterogeneous spectrum of illness course (1). There exist numerous methodological difficulties in the researches about course and outcome of schizophrenia (2). The international classification systems such as ICD-10 (WHO, 1993) (3) and DSM-IV TR (4) divide the longitudinal course of schizophrenia into subtypes based on the symptom patterns that are typically diagnosed. However, social

competence, functional and social impairment, conventional symptom patterns (negative and cognitive symptoms), disability and clinical outcomes of schizophrenia are closely related with each other (5-7). The social factors determined by socio-cultural environment may contribute in some extent to the heterogeneous course of schizophrenia (8,9). Moreover, many social factors are considered among the features that predict the good and poor prognosis in schizophrenia (10,11). At the early stage of the illness, patients with schizophrenia have a significant degree of social impairment (12) Changes in the environment or living condition may result with significant decrease in negative symptoms in the medium term course (13). Marital and occupational status, living and financial situation are considered as the most important variables in the social outcome assessments (12).

The relationship between social factors and the level of care received is complex (14-18). Social factors may often influence the access to the treatments and as a consequence of this unfortunate fact, the level of wellbeing that a patient could reach in the long term may be different.

Although, the effect of each social and demographic characteristics on the clinical outcomes of schizophrenia patients are studied, the outcomes of specific group or social classes sharing similar sociodemographic characteristics remains unknown. Since, in daily clinical practice, physicians attempt to categorize patients according to their clinical and social characteristics for the sake of choosing the best treatment, the classification approach might be more applicable. A potential harmful consequence of this unavoidable mental classification during routine practice is to preserve the more expensive but with more tolerable and broader efficacy only for patients from social class that physicians presume this drug would be more beneficial. Similarly, "Latent Class Analysis (LCA) provides a means of identifying a mixture of subgroups in a population measured by multiple categorical indicators" (19) and is used to determine class membership of cases. LCA models hypothesizes that the co-variation actually observed among the variables is due to the case mixture of unobservable groups of subjects (20). This analysis has been used frequently in the psychiatric typology to test diagnostic criteria and classification systems (21,22) and to identify subtypes

(23,24). As Bollen (25) stated "latent variables provide a degree of abstraction that permits us to describe relations among a class of events or variables that share something in common, rather than making highly concrete statements restricted to the relation between more specific, seemingly idiosyncratic variables." LCA hypothesizes that several homogeneous subgroups can be obtained from a heterogeneous group by evaluating and classifying associations among different variables. This type of analysis may allow physician to perceive different patient's social groups (social casemix) in a very heterogeneous patient data flow from every day practice. If different outcomes related to each group exist, this information may be used to provide the optimal treatment alternatives.

The tendency of keeping most recent pharmacological treatments for patients who are most likely to benefit (first episode, younger, good pre-morbid functioning etc…) , is reported in natural follow-up and in chart review studies (26,27). This clinical trend is not limited with clinical characteristics of the patients but also social and even racial characteristics play an important role in the selection of medications (28,29).

In this report, we performed a post-hoc analysis to a subset of patients to identify latent social classes in Turkish patients with schizophrenia who participates IC-SOHO observational study. We hypothesized that there will be no difference between identified social classes in the improvement of positive, negative and overall psychopathology after 12 months of a treatment that is based on standard clinical practice. We also compared the efficacy of typical and atypical antipsychotic monotherapy groups on the improvement of schizophrenia symptoms within different social classes at 12 months.

MATERIAL AND METHODS

Study Design and Patients:

The IC-SOHO study is a longitudinal (3-year), non-interventional, prospective, observational, open-label study of the treatment of schizophrenia in Turkey. The primary objective of the study is to understand the comparative outcomes associated with antipsychotic medication therapies initiated or changed during

outpatient treatment for schizophrenia. The secondary objective of the study is to understand the pharmacological treatment patterns for schizophrenia. The study is currently being conducted in 25 countries from 4 continents. This article will report the results of a latent social class analysis applied to a single country subset taken from the larger Intercontinental SOHO study, in order to perform it in a culturally more homogeneous group of patient.

Participating psychiatrists offered enrolment at their discretion to patients who met the following criteria : (1) present within the current course of care, (2) will initiate or change antipsychotic medication for the treatment of schizophrenia (ICD-10 or DSM-IV Criteria), (3) will initiate or change the antipsychotic medication in the outpatient setting or in the hospital when the admission was planned for the antipsychotic initiation or change, (4) at least 18 years of age, and (5) will not be simultaneously participating in a different study that includes a treatment intervention and/or an investigational drug. Patients were included regardless of whether the new antipsychotic drug substituted a previous medication or was an addition to existing treatment and regardless of the reason for the treatment change. Newly diagnosed and antipsychotic naïve patients were also included in the study. All patients were informed about the study and at least oral consent that is documented in the clinical report forms were required to enable the release of their personal medical information. There was not any local ethical review regulation for observational studies when the study has been implemented in Turkey.

The IC-SOHO study was designed to provide two patient cohorts of approximately equal size: the first group of patients who were initiated or changed to olanzapine, and the second group of patients who were initiated or changed to non-olanzapine antipsychotic therapy.

While each participating psychiatrist was requested to enroll at least one block of 10 patients, with 5 patients in each cohort, a minimum number of patients per psychiatrist was not required. This was done by allocating alternate patients to each cohort in order to provide approximately equal numbers in each cohort. Investigators were instructed to make treatment decisions independent of the study and then evaluate whether patients were eligible for inclusion based on entry criteria and the alternating structure of enrolment.

The data collected were similar to those usually collected in routine clinical practice, including patient demographics, medical resource use, clinical, functional and social status, antipsychotic and other co-prescribed medication use, tolerability, patient and physician reported compliance, sexual function, alcohol and substance abuse, and quality of life. Information regarding social functioning items including housing conditions (independent, dependent, supervised or hospitalized), work status (employed paid/unpaid, unemployed able to work/unable to work or retired), number of social activities in past 4 weeks, relationship with spouse or partner were collected by interviewing patients and relatives. Tolerability data was collected by using an adverse event questionnaire that included a list of the most frequently observed ones with typical and atypical antipsychotics (EPS, TD, hyperprolactinemia symptoms / sexual dysfunction, and weight and height measurements). The missing data of the respective cases were not included in the analysis. However, investigators continued to use the standard procedures to make reports to the company the adverse events that were not listed in the clinical report forms. Clinical status was assessed using the Clinical Global Impression – Severity (CGI-S) Scale (30). For the brevity purpose of this study the schizophrenic symptom domains measured on the CGI-S included overall symptom severity. According to the logic used in other psychiatric disorders, specific, single-item scales to assess positive, negative, depressive symptoms and cognitive symptoms have been developed based on the CGI scale.

Statistical Analysis:

We evaluated the study data with exploratory and descriptive analyses to gain an understanding of the qualitative and quantitative nature of the sample studied. Part of the baseline analysis described patient characteristics by sociodemographic, clinical and functional status for the total group of patients. For all the groups parameters means and percentages were calculated. The LEM 1.0 software (31) was used to perform a latent class analysis (LCA) to identify social classes in Turkish SOHO cases. LCA is a statistical method used for discovering the smallest number of classes (or groups) of cases with similar characteristics

that can explain the observed relationship among a set of items. The first step of the analysis is to identify homogeneous classes of patients according to their indicators (social functioning items). The following step is to estimate for each patient, the probability of belonging to a specific class. Class names were defined based on the most prominent characteristics of groups. The P=0.05 level (two-sided) was adopted for all analysis for statistical significance. The principal statistical analysis tested the null-hypothesis of no difference among the five social class groups. The model included 4 aspects of social functioning items as indicators (relationship, housing status, work status, social status). The cases were assigned to the most likely class based on the posterior probabilities from the model.

We compared mean change of psychopathology between social classes by using Kruskal-Wallis test (32) for all patients and for patients treated with antipsychotic monotherapy. The efficacy of typical and atypical antipsychotics within each social class treated with monotherapy antipsychotic was compared by using chi-square test.

RESULTS

A total of 692 patients were enrolled in the study at baseline. Of those patients, 289 received a combined drug treatment and/or changed their treatment during one year

follow-up period. The study population consisted of 409 (59.1%) male and 283 (40.9%) female patients with a mean age of 33.8(SD: 10.6) years. 13.9% of patients were antipsychotic naïve and the mean of overall symptom severity (CGI-S) at baseline was 3.7 (S.D:1.08). A total of 614 cases, with no missing data with regard to indicator values, were used in the latent class analysis. The distribution of indicator variables revealed that most of the Turkish-SOHO patients were in residence as a dependent family member (67%), were socially inactive (54.5%), had not a spouse/partner relationship (66.6%) and only 21.2% of these patients had a paid employment during last four weeks of this cross-sectional assessment (Figure 1). 14.1% of the patients in this subset were neuroleptic naïve. 87.7% of all patients were rated by the treating psychiatrist as almost always compliant with the medication during 12 months. We identified 5 classes of patients, that share similar characteristics, (Likelihood ratio chi-square=107.1, df=347) with 4 aspects of social functioning items as indicators in this latent class analysis (Table 1). Social classes 5 (Inactives, n=239, 38.9%) and 1(In a relationship, n=181, 29.5%) were the most common and accounted for two thirds of the Turkish IC-SOHO sample. 15.3% of the cases (n=94) were assigned in Social class 2(No-relationship Unemployed Dependents). Cases in class 3(n=71) (No-relationship Employed Dependents) and class 4 (n=29) (No-relationship Retirees) constituted 11.6% and 4.8% of the whole sample, respectively. All

| Table 1: Latent class model for social casemix in the Turkish SOHO subset				
Class	In a Relationship	Housing Status	Work Status	Social Status (activity per month)
1: In a Relationship	Yes (100%)	67.4% Independent 32.6% Dependent*	35.9% Employed 35.9%Unemployed 19.9% Retired	61.3% Somewhat Active (at least 1)
2: No-Relationship Unemployed dependents	No (0%)	92.6% Dependent 6.4% Independent*	88.3% Unemployed	%100 Active (at least 1)
3: No relationship Employed Dependents	No (0%)	74.6% Dependent 21.1% Independent	78.8%Employed	%77.5 Mostly active (at least 1)
4: No Relationship Retirees	No (3.4%)	62.1% Independent 20% Need Supervision 10.3% Dependent	75.9% Retired	%68.9 Somewhat active (at least 1)
5: Inactives	No (9.6%)	87.4 % Dependent 5% Need Supervision	86.6%Unemployed	100%Totally Inactive (0 activities)
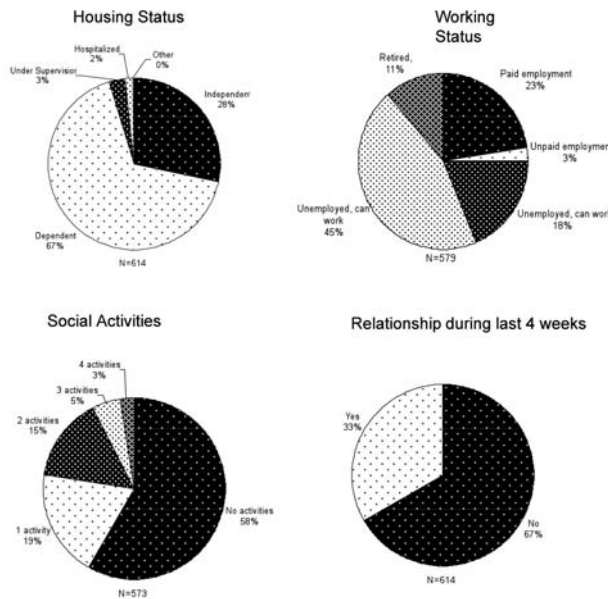
Figure 1: The distribution of the indicator variables included in the casemix analysis model

5.9, respectively) in "No-relationship Unemployed Dependents" and "No-relationship Employed Dependents". Health resources utilization was highest in the class 4 which has also longest duration of illness (Table 2). A subset of these patients who entered in the LCA maintained their antipsychotic monotherapy (n=325) prescribed at baseline throughout 12 months, furthermore 91% (n=296) of monotherapy patients received atypical antipsychotics during the first 1 year of the study (Figure 1). Final mean daily dosages (with standard deviation) of commonly prescribed antipsychotics as monotherapy were as follows: olanzapine (n=214) 14.7mg(6.2), all typicals (chlorpromazine equivalent, n=27) 490 mg(463.8), risperidone (n=52) 6.2 mg (2.9).

Although overall, positive and negative symptom severity scores were not statistically different between social classes at baseline, social class 5(inactives) had the worst psychopathology scores(mean CGI-S score with S.D for overall=5.0±1.0, positive=5.0±1.3 and negative=4.3±1.4 symptoms) in general (Table 3). The rate of prescribed antipsychotic drugs (olanzapine or non-olanzapine) between social classes was not statistically different at baseline (p=0.38, chi-square test). Atypical

classes, except for "no-relationship retirees", had male majority. "No-relationship Unemployed Dependents" included the youngest patients group. Age of first psychiatric admission was lowest (24.9 ± 8.9 and 25.5 ±

Table 2: Clinical and demographic characteristics of social classes

Class	Gender	Age Mean(SD)	Age at First Service Contact Mean(SD)	Neuroleptic naive	Mean duration of the illness(SD) years	Mean number of outpatient visit in the last 6 months(S.D)	Mean number of hospitalization in the last 6 months(S.D)
1	68.5% M, 31.5% F	37.9 (9.2)	30.1 (9.0)	16.8%	8.5(9)	7.7(11.2)	0.5(1.1)
2	53.2% M, 46.8% F	28.9(9.2)	24.9 (8.9)	17%	5.3(7.2)	11.3(16.6)	0.5(1.2)
3	60.6% M, 39.4% F	30.4(7.2)	25.5 (5.9)	15.9%	5.3(6.7)	9.1(13.9)	1.1(1.8)
4	44.8% M, 55.2% F	48.4(12.9)	39.9 (15.9)	3.4%	9.9(11.5)	10.3(16.4)	1.5(5.0)
5	54.0% M, 46.0% F	31.4(10.1)	25.9 (8.9)	11.6%	6.3(7.9)	7.7(11.6)	0.7(1.2)

Table 3: Profile of social casemix classes by baseline CGI symptoms

Class	CGI Positive Mean (SD)	CGI Negative Mean (SD)	CGI Overall Mean (SD)
1	4.1 ± 1.5	3.8 ± 1.3	4.4 ± 1.0
2	4.4 ± 1.4	4.2 ± 1.4	4.7 ± 1.0
3	4.4 ± 1.6	3.7 ± 1.3	4.4 ± 1.2
4	4.5 ± 1.7	4.2 ± 1.7	4.7 ± 1.1
5	5.0 ± 1.3	4.3 ± 1.4	5.0 ± 1.0

antipsychotic prescription account for 38.1% of class 1, 39.4% of class 2, 52.1% of class 3, 44.8% of class 4 and 39.3% of class 5 (p=0.31 between group difference for the rate of atypical prescription at baseline, chi-square test).

The analysis showed a marked improvement in all social classes in terms of negative, positive and overall psychopathology as measured by CGI-S scores (Figure 2). Comparison of each social class indicated no significant
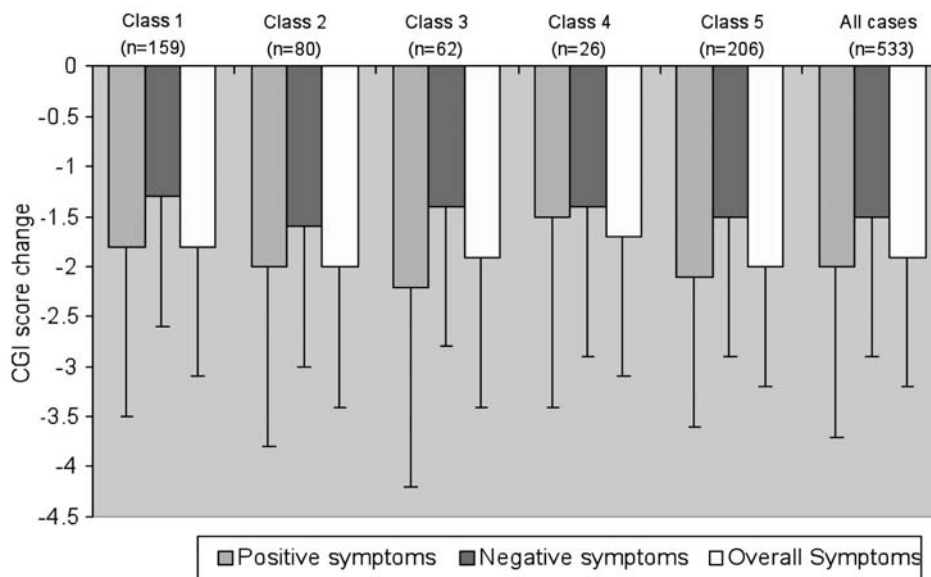
Figure 2: Change in symptoms at 12 months by social casemix classes (all patients)
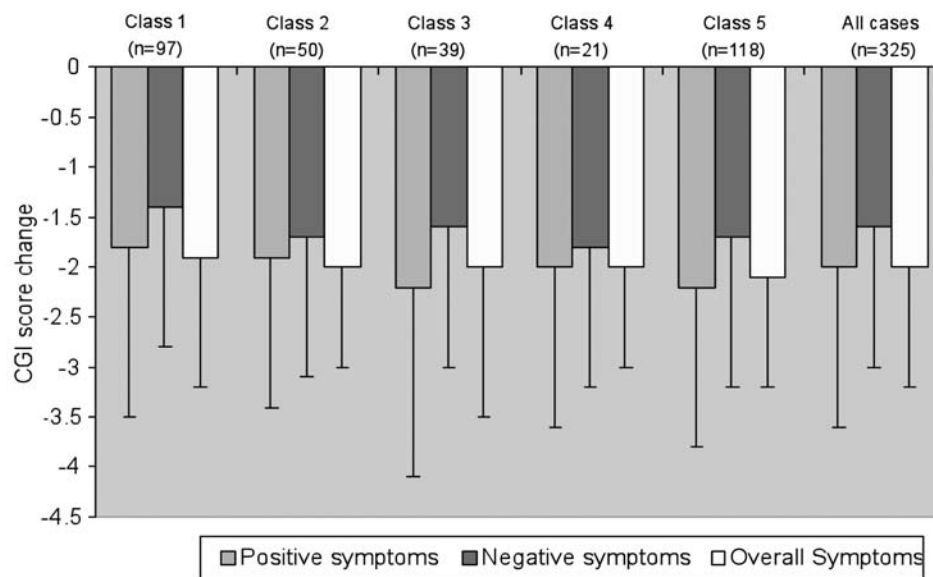

Figure 3: Change in symptoms by social casemix classes in patients treated with the same antipsychotic throughout 12 months as monotherapy

difference in the improvement of positive (p=0.60), negative (p=0.82) and overall symptom severity (p=0.86, Kruskal-Wallis test).

The level of improvement in psychopathology for different classes depending on treatment used as monotherapy throughout 12 month was also analyzed. 325 patients completed 12 month follow up period with same antipsychotic monotherapy prescribed at baseline.

In all social classes treatment with antipsychotics as monotherapy resulted with marked improvement (Figure 3); there was no significant difference in the improvement of symptoms severity scores (p=0.49 for CGI-positive, p=0.37 for CGI-negative and p=0.78 for CGI-overall, Kruskal Wallis test). CGI-S score decrease from baseline for positive symptoms was significantly higher with atypical antipsychotics when compared to typicals (CGI

positive score change; -2.1 vs. -1.3; p=0.006, respectively) in class 5 and for overall symptoms in class 5(CGI overall score change; -2.2 vs. -1.3; p=0.006) and in class 3(CGI overall score change; -2.1 vs. 0; p=0.038). Moreover, CGI-S score decrease from baseline for negative symptoms was significantly higher (CGI negative score change; -0.4 vs. -1.4; p=0.043) with atypicals compared to typicals in class 1.

DISCUSSION

We identified 5 different classes of patients that share different levels of social functioning and with different sociodemographic characteristics in this post-hoc analysis of IC-SOHO Turkish subset. This analysis compared the improvement of positive, negative and overall psychopathology in these classes after 12 months of treatment that is based on standard clinical practice. As we hypothesized, the improvement of positive, negative and overall symptom severity was not different among patient groups at 12 months. The efficacy comparison of antipsychotic groups(atypicals vs. typicals) within different social class revealed that atypicals monotherapy were more effective in decreasing positive symptom scores in "Inactives" group and overall symptom score in "Inactives" and "No-relationship, employed, dependents" group compared with typicals.

Latent class 1 represents relatively more active, independent, aged, male schizophrenia patients with lower frequency of health service utilization. However, Latent class 3 is characterized by younger unemployed, dependent male patients with higher health service use. Latent class 2 represents unemployed, young patients from both sex, who have restricted relationship with others and they have frequent outpatient clinic visits. Latent class 4 consisted of relatively older, retired patients. Although they are somewhat independent they have low level of social relationship with others and they have highest inpatient service usage. Latent class 5 is the most inactive group and totally dependent, however their health service usage is not markedly high.

In this study with relatively stable outpatient schizophrenia patients, instead of psychopathologic symptom severity or diagnostic features, we used patients' social functioning levels, a relatively more constant index variable, as input variables for LCA to obtain classes. However, each of these latent classes may represents patients from different stages of the illness and transitions from one class to an other may also possible during its natural course (33). Therefore, these classes are latent and we can not describe them from indicators that are measured in this subset. The implicit definition of these classes may give useful insight to physicians to effectively match their patients or develop classification rules. Modeling of the classes is also practical for assessing associations between outcome variables in a different way.

The social and demographic characteristics of patient enrolled IC-SOHO study from Turkey are different compared with patients enrolled to European SOHO study. These differences may reflect the cultural pattern of the modern Western European societies and the different values in Turkish communities. This is very important to understand these differences when you are investigating how to reduce the stigma related to mental illness, and how to build community care for schizophrenics, or how to treat immigrant schizophrenic people in Western Europe who are coming from a country with more community based traditions. Croudace et al (34). have already performed this analysis with the same methodology on the Western European Schizophrenia Health Outcome study which represents a Western European schizophrenia population.

Latent class analysis of the Turkish IC-SOHO patients' baseline and 12 month data revealed important heterogeneity in social functioning. A 5-category social casemix variable has been added to the Turkish IC-SOHO dataset for use by other researchers. The latent class approach to multivariate categorical data has general utility for parsimonious, model-based cluster analysis of epidemiological data from observational studies. Casemix classes could be used to assist in the profiling of the IC-SOHO cohort in terms of other variables and in subsequent analyses: as a stratification variable; to match cohorts on social functioning (in addition to severity) and to model selection to treatment (propensity score approach).

This analysis helped us not only to define putative social classes of schizophrenia but also to observe the comparative effectiveness of the antipsychotics in these classes. While the common practice is to prescribing new medications to patients with better functionality and to

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those with predicted good outcomes (26,27) schizophrenic patients with different social functionality levels may have similar improvement during long term antipsychotic treatments. Although it is supposed that low functionality groups would benefit less (35), more improvement was observed in "Inactives" and "No-relationship, employed, dependents" classes treated with atypical compared to typicals. On the other hand, our finding can be interpreted as consistent with studies that show superior efficacy of atypical antipsychotic compared to typicals in chronic and difficult to treat schizophrenia patients (36,38).

The Turkish SOHO study has both strengths and limitations, as previously described (39); it has several limitations intrinsically associated with observational studies such as lack of randomization, blinding, the confounding effect of concomitant drugs and broad range of dosages, selection and evaluation biases. In contrast, observational studies can evaluate drug use in everyday clinical practice settings and avoid protocol-induced bias. Patients with schizophrenia from 7 different geographic regions and from different treatment settings (private and public) of Turkey are included in IC-SOHO study in order to maximize the external validity of the data obtained. Although an inter-rater reliability analysis is not performed, internal validity is also warranted by IC-SOHO study design, its comprehensiveness and size. There are also limitations that are associated with this analyze such as lack of validated scale to assess social functioning and absence of social worker view in the process of acquiring information.

While LCA of social functioning provided us discrete latent groups, this method cannot prove that such discrete groups exist (40). The existences and the utility of the classes should be verified through validation studies and independent replications. The generalizability of treatment results from IC-SOHO Turkish subset to other patients may be limited because our results may not be directly applicable to other latent classification of chronic schizophrenia or to other patient groups (e.g. patients from other countries, inpatients).

To our knowledge, this is the first report that analyzed latent classes in schizophrenia based on indicators of social functioning. Given the phenotypic heterogeneity of this disorder, the efforts of determining more homogeneous and distinctive clinical clusters that has important associations with other features of schizophrenia should be accentuated. The categorical modeling of social functioning may be simple and valid tool for the further exploration of the classes in schizophrenia patients. However, these results should be taken as preliminary and similar analysis in other schizophrenia samples by using other indicators of social functioning should be replicated to support the validity of patient social classes. Testing the long-term efficacy of different treatment in the putative groups may provide more realistic insight for functional outcomes of schizophrenia patients.

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