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Logistic Regression Models to Predict Factors Associated with Khat Abuse among Students in Jazan Region, Saudi Arabia

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Research Article

Abstract

Khat abuse is associated with many public health problems. Logistic regression analysis is an important tool used in the analysis of the relationship between various explanatory variables and nominal response variables. The objective of this study was to use this statistical method to determine the factors which are considered to be significant contributors to the use or abuse of khat among students at both levels schools and university of Jazan region, Saudi Arabia. The logistic regression models were used to build models for predicting the most important factors associated with khat abuse among study participants. A total number of 7696 students responded to the survey, of which 56.9% were males and 43.1% females. The study results revealed the significant impact of important predictors of Khat chewing in our sample were students' smoking status (OR=13.597, *P* value=0.000), gender (OR=5.283, *P* value=0.000), friends' using tobacco (OR=3.844, *P* value=0.000) and friends' using Khat (OR=1.368, *P* value=0.000). These results emphasize the importance of peer education interventions as one strategy for changing social norms in the studied population.

Keywords: Khat chewing; Predictors; Logistic regression.

1. Introduction

Research examining prevalence of khat chewing in Jazan region, kingdom of Saudi Arabia, suggests high prevalence of khat abuse among all components of Jazan region population, among them school and university students [1-5]. Khat use has been associated with severe public health problems [6-10]. In addition to the health problems, khat use is associated with economic and social problems including time wasting, since the amount of time spent in khat chewing is considerable. Also another group of studies established clear association between heavy Khat consumption and psychosis [11-15].

Logistic regression first used during the 1970's as statistical modeling that overcome shortcoming of Ordinary Least square (OLS) [16]. The growing literature on logistic regression as well as its simplicity in assumptions and application assisted in widespread of the use of the technique in most disciplines among which medical research [17-21].

Binary logistic regression is a type of predictive models which is used frequently when the dependent is a dichotomy and the independents or explanatory variables are of any type. The Logistic models uses maximum likelihood estimation after transforming the dependent into a logic variable (the natural log of the odds of the dependent occurring or not). Logistic regression models estimate the probability of a certain event occurring. Moreover logistic regression calculates changes in the log odds of the dependent, not changes in the dependent itself as OLS regression does [16].

In this article we used logistic regression model to predict the effect of some risk factors on the responses of khat abuse among students at two level of educational system, first intermediate and secondary schools, and second at University level of Jazan region southwest Saudi Arabia.

2. Materials and Method

2.1 Data and population

The data for this analysis was taken from two cross-sectional surveys conducted by Jazan Substance Abuse Research Centre, Jazan University, KSA during the academic year 2011/2012. The first focused students in the basic education involving the two stages intermediate and secondary schools of Jazan region, while the second focused on university students in the region. Participants were selected using a three-stage cluster random sampling. A structured self-administered questionnaire was used for data collection.

2.2 Logistic regression model

The proposed model takes the shape of famous log model [16-22] is as prescribed in equation (1):

$$\pi = \frac{\exp(B_o + B_1 x_1 + ... + B_k x_k)}{1 + \exp(B_o + B_1 x_1 + ... + B_k x_k)} \qquad (1)$$

Equation (1) can be written in the form in equation (2) using algebraic manipulation,

$$h\left(\frac{\pi}{1-\pi}\right) = B_o + B_1 x_1 + ... + B_k x_k \qquad (2)$$

Equation (2), although it is linear in its right side it is nonlinear function of the response variable π. For this reason *maximum likelihood* is used to obtain these estimates [23].

$$OR = \frac{odds(x+1)}{odds(x)} = \frac{\left[\dfrac{\pi(x+1)}{1-\pi(x+1)}\right]}{\left[\dfrac{\pi(x)}{1-\pi(x)}\right]} = e^{\beta} \qquad (3)$$

Equation (3) provides the good feature of logistic regression, the Odds Ratios, which is also

Given by $\dfrac{\pi}{1-\pi} = \dfrac{P(y=1)}{P(y=0)}$ is known as the odds of the event y=1 occurring.

2.3 Estimation procedures

Data: n_i observations at the ith of m distinct levels of the independent variable(s), with y_i successes can be written in equation (4).

$$X = \begin{bmatrix} x_1' \\ x_2' \\ \vdots \\ x_m' \end{bmatrix} \qquad x_i' = \begin{bmatrix} 1 & x_{1i} & \cdots & x_p \end{bmatrix} \qquad \beta = \begin{bmatrix} \beta_0 \\ \beta_1 \\ \vdots \\ \beta_p \end{bmatrix}$$

(When p=1) $\qquad\qquad\qquad\qquad\qquad$ (4)

With Likelihood and log-Likelihood Functions:

$$L(\beta \mid (n_1, y_1), ..., (n_m, y_m)) = \prod_{i=1}^{m} \left(\frac{n_i!}{y_i!(n_i - y_i)}\right)\left(\frac{\exp(x_i'\beta)}{1+\exp(x_i'\beta)}\right)^{y_i}\left(\frac{1}{1+\exp(x_i'\beta)}\right)^{n_i - y_i}$$

$$\log(L) = \sum_{i=1}^{n}\left(\log(n_i!) - \log(y_i!) - \log((n_i - y_i))\right) + \sum_{i=1}^{n} y_i x_i'\beta - \sum_{i=1}^{n} n_i \log\left(1 + \exp(x_i'\beta)\right)$$

(5)

The derivative of the log-likelihood wrt β χαν β can be given by:

$$\frac{\partial \log(L)}{\partial \beta} = \sum y_i x_i - \sum n_i \frac{1}{1+\exp(x_i'\beta)} x_i \exp(x_i'\beta) = \sum (y_i - n_i \pi_i) x_i = g(\beta)$$

(6)

While the Hessian matrix:

$$\frac{\partial^2}{\partial\beta\partial\beta'} = -\sum n_i x_i \frac{\left(1+\exp(x_i'\beta)\right) x_i' \exp(x_i'\beta) - \exp(x_i'\beta) x_i' \exp(x_i'\beta)}{\left(1+\exp(x_i'\beta)\right)^2}$$

$$= -\sum n_i x_i x_i' \exp(x_i'\beta) \frac{1}{\left(1+\exp(x_i'\beta)\right)^2} = -X'WX = -G(\beta)$$

$$W_{ii} = n_i \pi_i (1-\pi_i) \qquad W_{ij} = 0 \quad i \neq j$$

(7)

Using the Newton-Raphson-Algorithm, the final coefficients take the shape:

$$\hat{\beta}^{NEW} = \hat{\beta}^{OLD} - \left[G\left(\hat{\beta}^{OLD}\right)\right]^{-1} g\left(\hat{\beta}^{OLD}\right) \qquad (8)$$

2.4 Model assumptions and strategy for analysis

The proposed Logistic regression model in equation (2) was used to assess the significance of the explanatory variables in predicting the dichotomous response variable of khat use among study population. In the initial stage of analysis all study variables were tested, the aim was looking for factors that clearly demonstrated risk or protective properties and also for variables significant in the univariate regression (with a p-value<0.25). Risk factors are those factors believed to have a negative impact on the likelihood of khat abuse while protective factors are those factors that, when in place, are believed to significantly reduce the likelihood of khat abuse. After these factors were identified, the logistic regression procedure was used using stepwise selection method. This enabled us to select those significant variables which impact substance abuse, while at the same time removing those variables which have a lesser or no impact on khat use among study population. The final selected explanatory variables include, gender, tobacco use, students believes about khat effect on academic performance and health, peers use of tobacco and khat, family use of khat which involves whether father, mother, sister and brother khat use or not. All variables studied were dictums either the response yes or no.

SPSS computer program was used to generate indicator variables for the levels of each categorical predictor. Reference groups were chosen for each predictor as well, corresponding to which interpretation would be most useful for understanding

khat chewing behavior. All explanatory variables of interest were tested first for possible interactions. Elimination was based on the highest insignificant term at each stage was sequentially removed until all variables fit within the desired 0.05 significance level. By hand elimination was used in order to keep control over which variables were being deleted. This was to make sure the final model would make sense clinically in relation to khat use. For those interactions that were significant, the main effects of the interactions were also kept in the model, regardless of significance.

Parameter estimate and odds ratio probabilities equal to or less than 0.05 were considered statistically significant and kept in the model. Control variables specified by the workgroup were left in the model with the other predictors. Individual parameter estimates were tested by the Wald statistics.

Goodness of fit and model assumptions was also checked. Some of these include multicollinearity of the predictor variables, ROC curves, comparison of AIC values, Likelihood Ratio Test and the Hosmer and Lemeshow goodness-of-fit test [21].

the study population. The models were arranged according to education school levels and type of faculties. The table showed that all listed variables were independent risk factors for khat chewing except history of anxiety and depression and the khat chewing status of the mother at the intermediate school level (P value less than 0.05 for all mentioned predictors variables).

For the secondary educational level, all factors remained as significant predictors for khat chewing, except History of depression and having a father chewing khat. For Health related colleges, Arts colleges and scientific colleges of university level, gender, tobacco use, the believe that khat chewing is not affecting health negatively, having a friend use khat or smoke, the believe that khat is not affecting academic performance negatively and having a brother using khat increases the likelihood of abusing khat (Table 2).

Table 3 illustrates logistic models for study participants according to gender. All mentioned variables were significantly associated and increasing the risk of khat chewing for males except having a sister using

Table 1. Some descriptive results.

Characteristics	Male	Female	Total
Institutions			
Schools	2215 (50.6)	1717 (51.8)	3932 (51.1)
University	2165 (49.4)	1599 (48.2)	3764 (48.9)
Levels			
Intermediate	930 (21.2)	748 (22.6)	1678 (21.8)
Secondary	1285 (29.3)	969 (29.2)	2254 (29.3)
Health Related Colleges	600 (13.7)	331 (10.0)	931 (12.1)
Arts Colleges	546 (12.5)	834 (25.2)	1380 (17.9)
Sciences Colleges	1019 (23.3)	434 (13.1)	1453 (18.9)
Khat chewing			
Non-Khat chewers	2771 (63.3)	3184 (96.0)	5955 (77.4)
khat Chewers	1609 (36.7)	132 (4.0)	1741 (22.6)
Total	4380 (100.0)	3316 (100.0)	7696 (100.0)

3. Results

Table 1 presents some descriptive results about the study participants. According to the table 7696 students responded to the survey, of whom 56.9% were males and 43.1 were females. The distribution of students according to educational institutions showed that schools students constituted 51.1%, while University students were 48.9%. The prevalence of khat chewing among students showed that 36.7% of males and 4% of females were khat chewers (Table 1).

Table 2 presents the logistic regression models for the important factors which found are with relationship with the dependent variable khat chewing among

khat (p value=0.287). The female model in the same table suggested that the important factors were tobacco use which increases the risk khat chewing more than 10 times (OR=10.765; 95% CI: 6.221-18.627; P value=0.000), the believe that khat has no negative health effect (OR=4.019; 95% CI: 2.28-7.06; P value=0.000), friend using khat ((OR=3.176; 95% CI: 1.701-5.932; P value=0.000) (Table 3).

Table 4 provides two logistic models for school and university students. According to the table all factors were statistically significant predictors for khat chewing among school students, whereas for university students, some of the variables were turned to be insignificant predictors for khat abuse, they were history of anxiety and depression and the

Table 2. Logistic model for predictors of khat using-according to type of school or college.

Level	Predictors	B	S.E.	Wald	Sig.	Exp(B)	95% C.I. for EXP (B)	
							Lower	Upper
Intermediate	Gender=Male	1.624	0.316	26.456	0.000	5.074	2.732	9.420
	Tobacco using=Yes	2.251	0.264	72.521	0.000	9.499	5.658	15.948
	Khat affecting Health=No	0.650	0.246	6.946	0.008	1.915	1.181	3.104
	History of Anxiety=Yes	0.145	0.247	0.344	0.557	1.156	0.712	1.877
	History of depression=Yes	0.131	0.244	0.288	0.591	1.140	0.706	1.840
	Friend using Khat=Yes	1.067	0.280	14.481	0.000	2.906	1.677	5.033
	Friend using tobacco=Yes	0.300	0.271	1.229	0.268	1.351	0.794	2.297
	Khat affecting Academic=No	1.678	0.258	42.146	0.000	5.352	3.225	8.882
	Father using Khat=Yes	0.838	0.217	14.931	0.000	2.312	1.511	3.537
	Brother using Khat=Yes	0.682	0.220	9.606	0.002	1.977	1.285	3.042
	Sister=using Khat=Yes	0.174	0.602	0.084	0.772	1.190	0.366	3.876
	Constant	-5.235	0.745	49.416	0.000	0.005		
Secondary	Gender=Male	1.884	0.251	56.531	0.000	6.578	4.026	10.749
	Tobacco using=Yes	2.806	0.201	193.994	0.000	16.547	11.149	24.560
	Khat affecting Health=No	0.609	0.204	8.896	0.003	1.838	1.232	2.743
	History of Anxiety=Yes	0.590	0.198	8.887	0.003	1.804	1.224	2.659
	History of depression=Yes	0.258	0.185	1.957	0.162	1.295	0.902	1.860
	Friend using Khat=Yes	1.207	0.250	23.306	0.000	3.344	2.049	5.460
	Friend using tobacco=Yes	0.619	0.222	7.805	0.005	1.857	1.203	2.867
	Khat affecting Academic=No	1.758	0.217	65.881	0.000	5.799	3.793	8.865
	Father using Khat=Yes	0.290	0.172	2.830	0.093	1.336	0.953	1.873
	Brother using Khat=Yes	0.441	0.172	6.542	0.011	1.554	1.109	2.179
	Sister=using Khat=Yes	-1.141	0.428	7.100	0.008	0.319	0.138	0.739
	Constant	-4.004	0.530	57.060	0.000	0.018		
Health related Colleges	Gender=Male	2.301	0.501	21.070	0.000	9.986	3.738	26.674
	Tobacco using=Yes	2.430	0.300	65.794	0.000	11.360	6.315	20.435
	Khat affecting Health=No	1.365	0.290	22.098	0.000	3.914	2.216	6.914
	History of Anxiety=Yes	0.313	0.369	0.723	0.395	1.368	0.664	2.817
	History of depression=Yes	0.304	0.361	0.707	0.400	1.355	0.668	2.750
	Friend using Khat=Yes	1.211	0.397	9.317	0.002	3.357	1.542	7.304
	Friend using tobacco=Yes	0.458	0.331	1.913	0.167	1.581	0.826	3.027
	Khat affecting Academic=No	1.401	0.292	22.986	0.000	4.061	2.290	7.202
	Father using Khat=Yes	0.896	1.482	0.365	0.546	2.449	0.134	44.718
	Brother using Khat=Yes	0.659	0.276	5.729	0.017	1.934	1.127	3.318
	Sister=using Khat=Yes	-0.607	0.708	0.735	0.391	0.545	0.136	2.184
	Constant	-6.200	0.983	39.739	0.000	0.002		

	Predictors	B	S.E.	Wald	Sig.	Exp(B)	Lower	Upper
Arts Colleges	Gender=Male	1.881	0.407	21.307	0.000	6.557	2.951	14.572
	Tobacco using=Yes	3.087	0.315	96.323	0.000	21.918	11.831	40.603
	Khat affecting Health=No	1.422	0.345	17.022	0.000	4.144	2.109	8.142
	History of Anxiety=Yes	-0.252	0.408	0.381	0.537	0.777	0.349	1.730
	History of depression=Yes	-0.223	0.400	0.310	0.578	0.800	0.365	1.754
	Friend using Khat=Yes	1.067	0.423	6.359	0.012	2.907	1.268	6.665
	Friend using tobacco=Yes	-0.279	0.359	0.603	0.437	0.756	0.374	1.530
	Khat affecting Academic=No	1.258	0.302	17.312	0.000	3.520	1.946	6.367
	Father using Khat=Yes	0.438	0.303	2.086	0.149	1.550	0.855	2.809
	Brother using Khat=Yes	1.422	0.315	20.387	0.000	4.145	2.236	7.683
	Sister= using Khat=Yes	-0.687	0.893	0.592	0.442	0.503	0.087	2.896
	Constant	-5.066	1.104	21.068	0.000	0.006		
Sciences Colleges	Gender=Male	2.004	0.496	16.324	0.000	7.422	2.807	19.627
	Tobacco using=Yes	3.109	0.272	131.090	0.000	22.396	13.153	38.132
	Khat affecting Health=No	1.681	0.245	46.913	0.000	5.374	3.321	8.694
	History of Anxiety=Yes	-0.038	0.288	0.018	0.894	0.962	0.547	1.692
	History of depression=Yes	0.360	0.295	1.486	0.223	1.433	0.804	2.555
	Friend using Khat=Yes	1.817	0.414	19.298	0.000	6.155	2.736	13.846
	Friend using tobacco=Yes	0.427	0.291	2.155	0.142	1.533	0.867	2.713
	Khat affecting Academic=No	1.679	0.230	53.134	0.000	5.360	3.413	8.419
	Father using Khat=Yes	0.375	0.233	2.595	0.107	1.455	0.922	2.297
	Brother using Khat=Yes	1.069	0.233	21.012	0.000	2.914	1.844	4.603
	Sister=using Khat=Yes	0.074	0.857	0.007	0.931	1.076	0.201	5.776
	Constant	-6.745	1.034	42.550	0.000	0.001		

Table 3. Logistic model for predictors of khat using-according to gender.

Gender	Predictors	B	S.E.	Wald	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Male	Tobacco using=Yes	2.631	0.121	470.774	0.000	13.884	10.947	17.608
	Khat affecting Health=No	1.546	0.117	174.757	0.000	4.692	3.731	5.901
	History of Anxiety=Yes	1.132	0.118	91.793	0.000	3.102	2.461	3.910
	History of depression=Yes	0.246	0.128	3.723	0.054	1.279	0.996	1.643
	Friend using Khat=Yes	0.307	0.129	5.682	0.017	1.359	1.056	1.748
	Friend using tobacco=Yes	1.361	0.165	68.051	0.000	3.898	2.822	5.386
	Khat affecting Academic=No	0.533	0.136	15.289	0.000	1.703	1.304	2.224
	Father using Khat=Yes	0.545	0.110	24.703	0.000	1.725	1.391	2.139
	Brother using Khat=Yes	0.854	0.110	60.691	0.000	2.350	1.895	2.913
	Sister= using Khat=Yes	0.372	0.349	1.135	0.287	1.451	0.732	2.878
	Constant	-4.282	0.226	357.755	0.000	0.014		
Female	Tobacco using=Yes	2.376	0.280	72.155	0.000	10.765	6.221	18.627
	Khat affecting Health=No	1.391	0.288	23.348	0.000	4.019	2.286	7.067
	History of Anxiety=Yes	0.542	0.353	2.360	0.124	1.719	0.861	3.431
	History of depression=Yes	0.184	0.316	0.339	0.560	1.202	0.647	2.233
	Friend using Khat=Yes	0.164	0.338	0.235	0.628	1.178	0.608	2.283
	Friend using tobacco=Yes	1.156	0.319	13.148	0.000	3.176	1.701	5.932
	Khat affecting Academic=No	-0.902	0.315	8.173	0.004	0.406	0.219	0.753
	Father using Khat=Yes	0.216	0.273	0.628	0.428	1.241	0.727	2.119
	Brother using Khat=Yes	0.646	0.279	5.375	0.020	1.907	1.105	3.292
	Sister=using Khat=Yes	0.626	0.456	1.884	0.170	1.870	0.765	4.572
	Constant	-4.357	0.445	95.818	0.000	0.013		

khat chewing of the status of the sister and the believe that khat is not affecting academic performance negatively (Table 4).

Table 5 summarizes predictors of khat chewing among all study participants at both levels schools and university. The table suggested that the most important independent predictors of Khat chewing in our sample were students' smoking status (OR=13.597, P value=0.000), gender (OR=5.283, P value=0.000), friends' use tobacco (OR=3.844, P value=0.000) and friends' use of Khat (OR=1.368, P value=0.000) (Table 5).

4. Discussion and Conclusion

The aim of this study was the use of logistic regression models, to determine the significant contributory factors that result in the use or abuse of khat among Jazan students at both levels of schools and universities. These factors were examined in two stages, stage; univariate analysis was used to determine the most important significant factors and then the use of these significant factors order to determine what were important among them in predicting khat use among the study participants. The study results highlight the significant impact of independent predictors of Khat chewing in our sample as follows: student's smoking status

(OR=13.597, P value=0.000), gender (OR=5.283, P value=0.000), friends' use tobacco (OR=3.844, P value=0.000) and friends' use of Khat (OR=1.368, P value= 0.000). This result is further supported by other findings investigating factors associated with khat abuse in Saudi Arabia [2-4] in Yemen [23] and in Ethiopia [24,25].

Khat is a socially acceptable habit in Jazan and our findings suggest that khat control program efforts need to focus on peers to reduce the prevalence of the habit and its unfavorable consequences. Peer impact is higher among male users than among females. With both genders, these results emphasize the importance of health educational interventions as an important strategy for changing social norms in Jazan population.

5. Competing Interests

The authors declare that they have no competing interests.

Acknowledgement

Table 4. Logistic model for predictors of khat using-according to gender.

Control	Predictors	B	S.E.	Wald	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
School	Gender=Male	1.370	0.206	44.408	0.000	3.937	2.631	5.892
	Tobacco using=Yes	2.448	0.154	254.154	0.000	11.562	8.557	15.621
	Khat affecting Health=No	1.730	0.166	108.488	0.000	5.640	4.073	7.811
	History of Anxiety=Yes	0.584	0.158	13.623	0.000	1.794	1.315	2.447
	History of depression=Yes	0.484	0.158	9.351	0.002	1.622	1.190	2.211
	Friend using Khat=Yes	0.320	0.153	4.355	0.037	1.377	1.020	1.859
	Friend using tobacco=Yes	1.465	0.199	54.383	0.000	4.327	2.932	6.387
	Khat affecting Academic=No	0.484	0.178	7.371	0.007	1.623	1.144	2.303
	Father using Khat=Yes	0.486	0.140	12.120	0.000	1.626	1.237	2.139
	Brother using Khat=Yes	0.677	0.140	23.325	0.000	1.968	1.495	2.591
	Sister=using Khat=Yes	0.695	0.351	3.927	0.048	2.005	1.008	3.988
	Constant	-5.499	0.295	346.505	0.000	0.004		
University	Gender=Male	2.038	0.255	63.959	0.000	7.673	4.657	12.643
	Tobacco using=Yes	2.839	0.164	299.124	0.000	17.106	12.400	23.599
	Khat affecting Health=No	1.489	0.151	97.083	0.000	4.431	3.295	5.958
	History of Anxiety=Yes	1.521	0.161	89.089	0.000	4.578	3.338	6.279
	History of depression=Yes	0.012	0.194	0.004	0.949	1.013	0.692	1.482
	Friend using Khat=Yes	0.156	0.194	0.650	0.420	1.169	0.800	1.708
	Friend using tobacco=Yes	1.370	0.230	35.443	0.000	3.935	2.507	6.178
	Khat affecting Academic=No	0.218	0.184	1.408	0.235	1.243	0.868	1.782
	Father using Khat=Yes	0.527	0.150	12.286	0.000	1.694	1.262	2.275
	Brother using Khat=Yes	0.985	0.151	42.688	0.000	2.677	1.992	3.597
	Sister=using Khat=Yes	0.351	0.458	0.589	0.443	1.421	0.579	3.485
	Constant	-6.289	0.384	268.823	0.000	0.002		

Table 5. Logistic model for predictors of khat using-ll study participants.

Predictors	B	S.E.	Wald	Sig.	Exp(B)	95% C.I.for EXP(B)	
						Lower	Upper
Gender=Male	1.665	0.158	110.546	0.000	5.283	3.874	7.206
Tobacco using=Yes	2.610	0.110	561.803	0.000	13.597	10.958	16.872
Khat affecting Health=No	1.509	0.107	198.007	0.000	4.521	3.664	5.579
History of Anxiety=Yes	1.078	0.110	95.188	0.000	2.938	2.366	3.649
History of depression=Yes	0.213	0.117	3.308	0.069	1.238	0.984	1.558
Friend using Khat=Yes	0.281	0.119	5.581	0.018	1.324	1.049	1.671
Friend using tobacco=Yes	1.346	0.147	84.223	0.000	3.844	2.883	5.124
Khat affecting Academic=No	0.328	0.126	6.812	0.009	1.388	1.085	1.776
Father using Khat=Yes	0.512	0.101	25.586	0.000	1.668	1.368	2.034
Brother using Khat=Yes	0.806	0.101	63.211	0.000	2.240	1.836	2.733
Sister=using Khat=Yes	541	0.275	3.876	0.049	1.718	1.002	2.944
Constant	-5.778	0.232	621.745	0.000	0.003		

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