PREDICTION OF SUICIDAL IDEATION AMONG ADULTS IN BATTICALOA DISTRICT OF SRI LANKA VIA BINARY LOGISTIC REGRESSION MODEL

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ABSTRACT

Suicidal ideation is a strong predictor of suicide in both the general population as well as among adolescents. Suicidal ideation becomes severe and worsens when one fails to overcome a problem. The present study was focused on determining the prevalence and on predicting the suicidal ideation among adults in the Batticaloa District of Sri Lanka (BDSL). It was a quantitative cross-sectional study. Data were collected from the all adult patients who admitted in male and female medical wards of Base Hospital, Kaluwanchikudy (BHK) with the prior official permission of Medical Superintendent, BHK during the period of 1st January to 31st May 2019. Two-stage cluster sampling method was applied. All base hospitals of BDSL treated as primary cluster while all wards of BHK served as a secondary cluster. Statistical software (SPSS 25.0) was used to analyse the datathe and p-value < 0.05 was considered significant for all analyses. Ethical approval was obtained from the Ethical Review Committee, Faculty of Health-Care Sciences, Eastern University, Sri Lanka. Totally 237 adult participant recruited for this study. Majority of them (51.5%) were female. Prevalence of current suicidal ideation of the recruited participant is 20700/100,000. Moreover the prevalence of suicidal ideation within the last two months also numerically the same as the current prevalence. Prevalence of lifetime suicidal ideation is 24,900/100,000. The majority (95.7%) of the patients correctly classified as current non-suicidal thoughts people while 61.2% patients correctly categorised as current suicidal thoughts people and overall 88.6% patients were correctly classified to the corresponding groups. Prevalence of current suicidal ideation is high in the Batticaloa district of Sri Lanka compared to literature. Males are more prone to suicidal ideation compare to females. Interacted factors play a significant role to predict the current and lifetime suicidal ideation.

Keywords: suicidal ideation, prediction, adults, Batticaloa

INTRODUCTION

Suicide is a significant social and public health issue, however it is largely preventable. Every year there are more than 800,000 suicides around the world with the global mortality rate of 16 people per 100,000 or one death

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every 40 seconds. As the largest continent in the World, Asia accounts for about 60% of World suicides.

According to the statistics of Registrar General's office, at the time of independence (1948) suicide rate in Sri Lanka was 9 per 100,000 people. In the 1970s, it rose up to 19 per 100,000, and in the mid-1980s, it reached 33 per 100,000 and it remained static there afterwards. Mental health disorders (particularly depression and substance abuse) are associated with more than 90% of all cases of suicide.

Sri Lanka had the 4th highest suicide rate in the world at 28.8 per 100,000 (male rate - 46.4 per 100,000; female rate - 12.8 per 100,000). Crude suicide rate of Batticaloa district in 2011 was 23.7 per 100, 000. Conflict has now diminished and Sri Lanka is at peace, but yet suicide rates still prevail.

Suicidal ideation can be defined as; passive thoughts about wanting to be dead or active thoughts about killing oneself, not accompanied by preparatory behavior. Since suicide ideation logically precedes a suicide attempt or completed suicide, it seems appropriate to focus on the intensity, pervasiveness, and characteristics of the ideation and wish in order to assess current suicidal intention and potentially to predict later suicidal risk. One of the major predictors for committing or attempting suicide is the occurrence of suicidal ideation.

Moreover, the Swedish National Council for Suicide Prevention estimates that the ratio of suicides to attempted suicides to serious suicidal thoughts is approximately 1:10:100. Within the first year after the onset of suicidal thoughts, the risk for attempted suicide increases by approximately 170 times as the transition from suicidal thoughts to behavior is often implemented during this period of time.

In the absence of specific scientific studies concern about identifying the predisposing, risk and protective factors associated with suicidal behaviors and ideation in Batticaloa district, one of the specific objectives of this present study was focused towards to determine the prevalence and to predict the suicidal ideation among adults.

METHODOLOGY

It was a quantitative cross sectional study. Data were collected from the all adult patients who admitted in male and female medical wards of Base Hospital, Kaluwanchikudy (BHK) using a Structured Interviewer Administered Questionnaire (SIAQ) with the prior official permission of Medical Superintendent, BHK during the period of 1st January to 31st May, 2019. Two stage cluster sampling method was applied. All base hospitals of BDSL treated as primary cluster while all wards of BHK served as secondary

cluster. Statistical software (SPSS 25.0) was used to analyze the data and p-value < 0.05 was considered significant for all analyses. Ethical approval was obtained from Ethical Review Committee, Faculty of Health-Care Sciences, Eastern University, Sri Lanka.

RESULTS AND DISCUSSION

Descriptive Statistics

There were totally two hundred and thirty seven (237) adult (equal or more than 18 years old) participant recruited for this study. Among those majority of them (51.5%) were female patients. The prevalence of current suicidal ideation of the recruited participant is 20.7%. Moreover the prevalent of suicidal ideation within the last two months also numerically same as the current prevalence for suicidal ideation. The prevalence of lifetime suicidal ideation is 24.9%.

Binary Logistic Regression

Twenty eight (28) independent variables associated with suicidal ideation grouped into SIX factors via Explorative Factor Analysis (EFA) which were extracted and named as follows; F1-personal life and mental health status, F2-health status and married life, F3-sexual life of married people, F4-occupational status, F5-attempted suicide and F6-ethnicity. Moreover, the interacted factors were served as an independent variables for Binary Logistic Regression (BLR)

Binary logistic regression was performed in order to predict the group membership (OR) to determine the status of "current suicidal thoughts" ("yes" / "no") in patients who are participated in this study, could be predicted from the interacted factors (Independent variables).

Further, this binary logistic regression will be applied to determine the relationship between predictors (interacted factors) and status of dichotomous dependent variable ["current suicidal thoughts" ("yes" / "no")].

Case Processing Summary

Unweighted Cases[a]	N	Percent

Selected Cases	Included in Analysis	236	99.6
	Missing Cases	1	.4
	Total	237	100.0
Unselected Cases		0	.0
Total		237	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
1	0
2	1

Block 0: Beginning Block - will presents the results with only the constant included before any coefficients (independent variables: interacted factors) are entered into the equation.

Classification Table[a,b]

			Predicted		
			Q10		Percentage
	Observed		1	2	Correct
Step 0	Q10	1	0	49	.0
		2	0	187	100.0
	Overall Percentage				79.2

a. Constant is included in the model.

b. The cut value is .500

Then, logistic regression compares Block 0 model with a model including all the predictors (independent variables: interacted factors) to determine whether the latter model is more appropriate

Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)
Step 0 Constant	1.339	.160	69.642	1	.000	3.816

Therefore the percentage of the correctness to be a suicidal thought patient (category-yes) in the absence of independent variables is 79.2 (OR) in other words, the overall model fitting accuracy of the null model (intercept only) is 79.2% which is available in classification table.

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	F1F2	42.323	1	.000
		F1F3	.603	1	.437
		F1F4	5.981	1	.014
		F1F5	.720	1	.396
		F1F6	.334	1	.563
		F2F3	8.526	1	.004
		F2F4	.227	1	.634
		F2F5	15.422	1	.000
		F2F6	3.331	1	.068

	F3F4	5.752	1	.016
	F3F5	.214	1	.643
	F3F6	.118	1	.731
	F4F5	.724	1	.395
	F4F6	.022	1	.882
	F5F6	3.440	1	.064
Overall Statistics		90.385	15	.000

The inclusion of the independent variables to the model was significant for some of the independent variables considered here such as F1F2, F1F4, F2F3, F2F5 and F3F4 further this information was obtained through the variables not in the equation table.

There was an overall significance in null model (X^2=90.385, df=15 and p=0.000, thus, the indication is that, the model has a good fit which tested for following hypothesis; H_0: The model is a good fitting model. H_A: The model is not a good fitting model (i.e. the predictors have a significant effect).

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	109.163	15	.000
	Block	109.163	15	.000
	Model	109.163	15	.000

The results of the model which includes the predictors such as F1F2, F1F3, F1F4, F1F5, F1F6, F2F3, F2F4, F2F5, F2F6, F3F4, F3F5, F3F6, F4F5, F4F6 and F5F6 will be available via window of Block 1 Method = Enter.

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	131.933[a]	.370	.579

Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

There was a 11.86% [(88.6-79.2)/79.2*100] increase in the overall model fitting accuracy in the full model (inclusive of all independent variables) compare to null model (intercept only) with significant contribution of some independent variables to the model fitting.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	26.606	8	.001

Further, there is an another alternative statistics for model chi-square test to check the significance of model fitting test which is known as Hosmer and Lemeshow Test (H-L test) working on following hypothesis; H_0: The model is a good fitting model. H_A: The model is not a good fitting model (i.e. the predictors have a significant effect).

Contingency Table for Hosmer and Lemeshow Test

		Q10 = 1		Q10 = 2		
		Observed	Expected	Observed	Expected	Total
Step 1	1	21	21.787	3	2.213	24
	2	14	12.263	10	11.737	24
	3	6	6.422	18	17.578	24

4	4	3.380	20	20.620	24
5	2	2.215	22	21.785	24
6	0	1.296	24	22.704	24
7	0	.803	24	23.197	24
8	0	.539	24	23.461	24
9	1	.251	23	23.749	24
10	1	.044	19	19.956	20

Moreover, H-L test performing on the context of 10 ordered groups are created based on their estimated probability. Again, H-L test confirm that the model is here was a good fitting model which was already indicated by model chi square test.

However, there is another reliable measure of the relationship which is termed as Nagelkerke's R^2 and it is normally higher than the Cox and Snell's R-Square and further ranges from "zero" to "1".

Thus, 57.9% of the variance in the dependent variable such as; ("current suicidal thoughts" ("yes"/ "no") explained by this logistic regression model with respect to the Nagelkerke's R^2.

Classification Table[a]

			Predicted		
			Q10		
	Observed		1	2	Percentage Correct
Step 1	Q10	1	30	19	61.2
		2	8	179	95.7
	Overall Percentage				88.6

a. The cut value is .500

Although there is no close analogous statistic in logistic regression to the coefficient of determination (R^2) there are some approximations available through Model Summary Table of SPSS output such as; Cox and Snell's R-Square which attempts to imitate multiple R-Square based on 'likelihood', however its maximum can be (and usually is) less than 1.0, making it difficult to interpret.

The 37% of the variance in the dependent variable such as; ("current suicidal thoughts" ("yes" /"no") explained by this logistic regression model with respect to the Cox and Snell's R-Square.

The inclusion of the independent variables to the model was significant for some of the independent variables considered here such as F1F2, F1F3, F1F4, F1F5, F2F4, F2F5, F2F6, F3F4, and F5F6 further this information was obtained through the variables in the equation table.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1ª	F1F2	-3.613	.680	28.200	1	.000	.027	.007	.102
	F1F3	.534	.215	6.175	1	.013	1.706	1.119	2.600
	F1F4	1.134	.437	6.750	1	.009	3.108	1.321	7.313
	F1F5	.574	.281	4.159	1	.041	1.775	1.023	3.082
	F1F6	.181	.283	.407	1	.523	1.198	.688	2.088
	F2F3	-.281	.327	.735	1	.391	.755	.398	1.435
	F2F4	-.383	.194	3.897	1	.048	.682	.466	.997
	F2F5	.846	.397	4.529	1	.033	2.330	1.069	5.076
	F2F6	-.931	.247	14.206	1	.000	.394	.243	.640

F3F4	.695	.324	4.589	1	.032	2.003	1.061	3.783
F3F5	-.187	.212	.780	1	.377	.830	.548	1.256
F3F6	.255	.236	1.162	1	.281	1.290	.812	2.049
F4F5	.230	.395	.339	1	.561	1.258	.580	2.730
F4F6	.461	.236	3.812	1	.051	1.586	.998	2.518
F5F6	-.581	.280	4.315	1	.038	.559	.323	.968
Constant	2.266	.305	55.274	1	.000	9.644		

a. Variable(s) entered on step 1: F1F2, F1F3, F1F4, F1F5, F1F6, F2F3, F2F4, F2F5, F2F6, F3F4, F3F5, F3F6, F4F5, F4F6, F5F6.

95.7% of the patients participated in this study correctly classified as current non-suicidal thoughts people while 61.2% patients correctly categorized as current suicidal thoughts people and overall 88.6% patients were correctly classified to the corresponding groups.

CONCLUSION

Prevalence of current suicidal ideation is high in Batticaloa district of Sri Lanka compare to literature. Males are more prone to suicidal ideation compare to females. Interacted factors such as; personal life and mental health status, health status and married life, sexual life, occupational status, attempted suicide and ethnicity play significant role to predict the current and life time suicidal ideation among subjects who enrolled for this study.

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