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ORIGINAL ARTICLE

Association of health-related quality of life and suicidal risk in adolescents: A cross-sectional study

Asociación entre la calidad de vida relacionada con la salud y riesgo suicida en adolescentes: estudio transversal

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Abstract

Introduction: Health-related quality of life (HRQoL) deterioraton is a risk factor for suicide in adults, however, this aspect has been little studied in adolescents. **Objective:** To evaluate the association between HRQoL (measured with EQ-5D-5L) and suicidal risk in adolescents and its capacity for cross-sectional detection of suicidal risk. **Patients and Method:** 128 adolescents (15-19 years old) from Puerto Aysen (Chile) responded to the EQ-5D-5L questionnaire, the Okasha Suicide Scale and two anchoring questions of imminent suicide risk. A suicide risk case was considered to have a > 5 score on the Okasha scale or the affirmative answer to one of the anchoring questions. The index value of EQ-5D-5L was calculated and Odds Ratios (ORs) were estimated with confidence intervals (95% CI), adjusted for confounders. Areas under the ROC curve (AUC-ROC) were calculated to assess the discriminatory performance of EQ-5D-5L. **Results:** 21 (16.4%) adolescents were at suicidal risk. Controlling for confounders, the EQ-5D-5L dimensions associated with suicidal risk were pain/discomfort (OR: 2.5; 95% CI 1.1-6.1) and anxiety/depression (OR: 2.2; 95% CI 1.3-3.6). The AUC-ROC for both dimensions was 85% (95% CI 0.75-0.91) and 81% for the EQ-5D-5L index value (95% CI 0.72-0.89). **Conclusions:** HRQoL could be a risk factor for suicide in adolescents and in this way, the EQ-5D-5L could help in searching for high risk and hidden cases of suicidal risk.

Keywords:
Health-related quality of life;
suicide;
adolescents

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Introduction

Adolescent suicide (15 to 19 years) is a priority for the Chilean Public Health. The higher rates are localized in the south of Chile, especially in the Aysén Region[1]. If preventatives actions are not taken, according to the projections estimated of the Ministry of Health for 2020, the rates of this age group will increase by 39%. In this regard, awareness of the risk factors and the availability of cost-efficient tools for screening at risk are essential to prevent and create specific interventions.

Depression and previous suicide attempts are the major suicide factors, however, the evidence indicates that there are differences in the risk profile among the different age groups, such as self-inflicted lesions (with or without suicide intention) and behavioral/psychological alterations are the pincipal factors in adolescent[2-5], while in adults and elderly adults, chronic diseases and health-related quality of life (HRQL) are the most common factors[2,6]. In Chilean adolescent and young people, the most reported factors are depression, family dynamics[7], alcohol consumption, impulsivity[8] and previous suicide attempts. In this same age group, the HRQL[10] related with depression or as a result of suicide prevention interventions[11] was evaluated, however, the HRQL has not been taken into account as a suicide risk factor in adolescents since it is an age group chronic or disabling diseases are less frequent.

The HRQL is a multidimensional construct which includes physical health, psychological health and social valuation of both, which can be easily measured through short and validated instruments such as the EQ-5D-5L questionnaire. Even though there are specific questionnaires for investigation and stratification of the suicide risk at a community or individual level[12-16], only the Okasha suicidality scale is validated in Chile[17]. Also, suicidality scales do not consider that 66% of the victims do not communicate their plans or suicide thoguhts[18]. Thus, secondary suicide prevention (early detection of an adolescent in risk and hidden cases) can be improved with the inclusion of simple and widely used tools that address suicidality indirectly. We hypothesize that HRQL is related to suicide risk (attempt, ideation, and self-aggression) in adolescents since an auto-perception of a physical or psychological health deterioration would be a mediator between previous anxiety and suicidal behavior[19,20]; therefore, the EQ-5D-5L would have an adequate performance tool for screening hidden adolescents suicide risks in the community.

Patient and Method

Design

A transversal case control study, nested to a cohort of suicide risk adolescent investigation named RADAR (Red para la Atención y Derivación de Adolescentes en Riesgo Suicida), was performed,. During 2016, two out of six high schools in the commune of Puerto Aysén RADAR was implemented as a proof of concept. A municipal school and a private subsidized school were chosen, both with the lower scholar vulnerability assessment of the Sistema de Asignación con Equidad (IVE-SINAE) de la Junta Nacional de Auxilio Escolar y Becas (JUNAEB). According to JUNAEB data, the admission for 2015 was 905 students (362 municipal and 543 private subsidized) and the IVE-SINAE of the municipal school was 80.6% and 52.7% in the private subsidized school[21]. During April 2016, 128 adolescents and parents/tutors signed the consent form and were included in the RADAR investigation system, answering voluntarily the Okasha suicidality scale[17], two imminent suicide anchor questions, the EQ-ED-5L with previous written consent from the Research Foundation EuroQol and the Adolescent Risk-Taking questionnaire (ARTS)[22], among others.

Instruments

The questionnaires which were included in RADAR were transversally auto-administrated through a web platform (www.vivavivir.cl) with an approximate duration of 30 minutes.

The Okasha suicidality scale is composed of four items, where three address suicide ideation in different intensities; ¿Has pensado que la vida no la pena? ¿Has deseado alguna vez estar muerto? ¿Has pensado alguna vez terminar con tu vida?. And the fourth item is related to previous suicide attempts: have you ever tried to suicide? Each item is answered in an ordinal scale codified from 0 to 4 points (never, hardly ever, sometimes and many times), a total score from 0 to 12 can be obtained with the sum of the points of each item. Since this Okaska scale measures past suicde ideation and attemps, two anchoring question of recent suicide risk created bya group of professional experts on suicide were included: have you ever thought about ending your life in the last two weeks? Have you thought on self-damaging you in the last two weeks (cuts, burns or hits)?

A " suicide risk case" was defined with a total Okasha score higher or equal to 5, or to an affirmative answer to any of the two imminent suicide anchor questions. Control patients were those who had a score lower than 5 and gave a negative answer to both anchor questions.

The auto-administrated version of the EQ-ED-5L scale, validated in Chile to measure the HQRL[23,24] was used This scale consists of two parts, the first one measures the health status through five dimensions (mobility, self-care, uual activities, pain/discomfort and anxiety/depression), each dimension has five answer

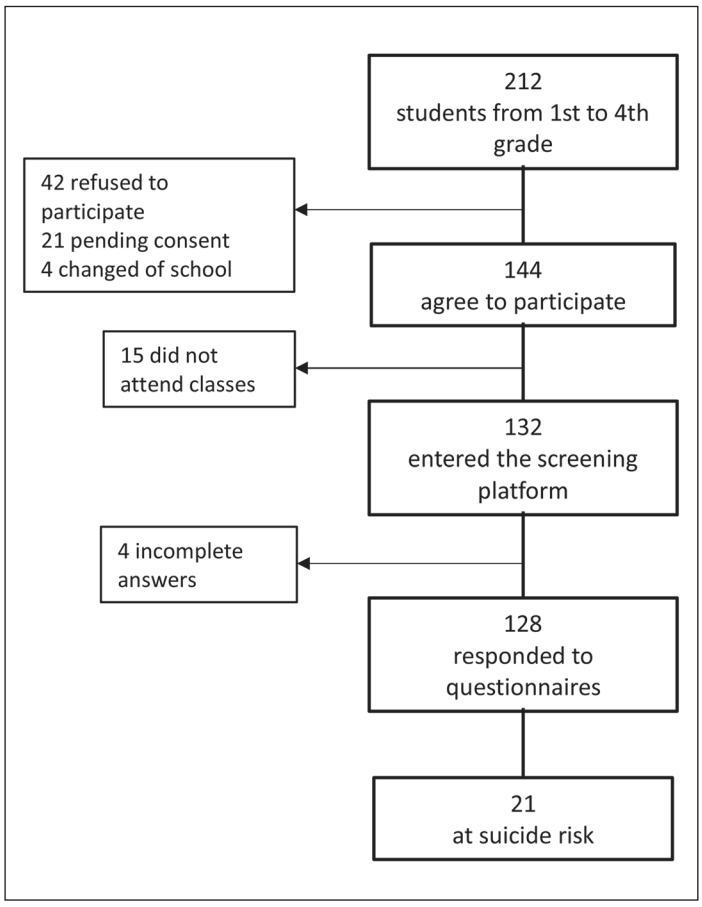

Figure 1. Recruitment flowchart of the study population.

levels which were addressed in an ordinal categorical scale: without problems, mild problems, moderate problems, acute problems and extreme problems. With the health profile of these dimensions, the "index value" of the EQ-ED-5L was calculated, the combination of standard values used in this index was from the United States since Chilean population values are not available in the Research Foundation EuroQol. This index indicates the health status of people, which vary from zero points "death" to one point "perfect health status", in a continuous quantitative scale. The second part of the EQ-ED-5L, called "EQ-VAS" measures the self-judgment of the person with respect to their own health status, it is recorded in a continuous quantitative scale, being cero "worst health" and a hundred "best health" they can imagine, in this case, the adolescent.

From the ARTS[25], questions related to the control of potential confounder were used; 'physical health problems report' (dichotomous scale), mother´s education level (as a substitute of the socioeconomic level in the ordinale scale: primary, secondary and high education) and history of alcohol/drugs problems (dichotomous scale).

Statistical analysis

In order to compare categorical variables between cases and controls, the Fisher exact test was used, since absolute frequencies lower than 5 were observed and the Mann Whitney test in the case of quantitative varia-

Table 1. Characterization of the study population

	All n = 128	Suicide risk cases n = 21	Controls n = 107	P value
Age. meas (SD)	15.9 (1.2)	16.0 (1.2)	15.9 (1.2)	0.315
Women	50.0 (64)	47.6 (10)	50.5 (54)	1.000
Students in a private school	54.7 (70)	61.9 (13)	53.3 (57)	0.632
Mother´s education level*				
Primary	15.6 (20)	19.6 (4)	14.9 (16)	0.688
Secondary	50.0 (64)	42.9 (9)	51.4 (55)	
High	43.0 (40)	38.1 (8)	33.6 (36)	
Alcohol /drug problems	19.4 (21)	13.3 (2)	20.4 (19)	0.731
Physical health problems	54.3 (63)	64.7 (11)	52.5 (52)	0.344
5Q-5D-5L index value. median (IQR)	0.84 (0.26)	0.74 (0.20)	0.86 (0.24)	<0.001
EQ-VAS. median (IQR)	90 (18)	90 (10)	90 (18)	0.689

All expressed in% (n) unless otherwise specified. SD: Standard Deviation. IQR: Interquartile range. *Four teenagers did not answer this question.

Table 2. Odds Ratios and 95% confidence intervals (95%CI) for the association of physical health problems, EQ-5D-5L and suicidal risk

Condition	Crude	Adjusted
Physical health problems[§]	1.7 (0.6 a 4.8)	1.4 (0.4 a 4.8)
EQ-5D-5L´s dimensions[¶]		
Movility	1.1 (0.6 a 2.2)	1.4 (0.6 a 3.3)
Self-cafe	0.9 (0.5 a 2.0)	1.1 (0.5 a 2.5)
Usual activities	1.5 (0.8 a 2.7)	2.1 (0.9 a 4.7)
Pain/discomfort	2.3 (1.3 a 3.9)*	2.5 (1.1 a 6.1)*
Anxiety/depression	1.9 (1.3 a 2.8)*	2.2 (1.3 a 3.6)*
EQ-VAS	1.0 (0.9 a 1.05)	1.0 (0.9 a 1.1)
EQ-5D-5L index value	0.02 (0.002 a 0.2)*	0.001 (0.00001 a 0.1)*

[¶]Adjusted by mother´s education level and alcohol /drug problems. [§]Adjusted by mother´s education level. alcohol/drug and physical health problems. *p < 0.05.

Table 3. Performance of the EQ-5D-5L scale as a screening tool for suicide risk in adolescents

	AUC-ROC (IC95%)	Cut-off point	SE %	SP %
Movility[a]	0.52 (0.44 a 0.60)	2	14.3	90.3
Self-cafe[a]	0.52 (0.45 a 0.59)	2	9.52	94.3
Usual activities[a]	0.55 (0.45 a 0.65)	2	23.8	85.3
Pain/discomfort[a]	0.71 (0.58 a 0.84)	2	72.2	65.0
Anxiety/ depression[a]	0.83 (0.75 a 0.91)	2	94.7	75.2
EQ-5D-5L index value[b]	0.81 (0.72 a 0.89)	0.2	82.3	40.7
EQ-VAS[c]	0.54 (0.35 a 0.74)	80	44.4	65.7

AUC-ROC: Area under the ROC curve. SE: sensibility. ES: specificity. [a]1= non or slight problems. 2=moderate problems. 3= severe problems. 4=unable. [b]0=death 1=healthy. [c]0= the worst state of health 100= the best state of health

bles with asymmetry in its distribution. P values lower than 0.05 were considered significant. Crude Odd Ratios (OR) and adjusted OR by confounder, with their respective 95% confidence intervals (CI95%) were estimated withlogistic regression models. The area under the ROC curve(AUC-ROC) with CI95% with the nonparametric method was calculated to evaluate the performance of the EQ-5D-5L and to determine the cut-off point of each dimension for a better sensitivity and specificity.

Ethical aspects

The study protocol was reviewed and approved by the Scientific Ethics Committee of the Universidad de Los Andes and of the Aysén Health Service, following Belmont and Helsinki principles.

Results

From the 144 adolescents that accepted to participate, 128 completely answered the RADAR questionnaires and 16.4% (21) were classified as suicide risk cases (Figure 1).

Table 1 indicates that the mean of age was 15.9 years (SD 1.2), 50% of the population were females, 19.4% reported previous alcohol/drugs abuse and 54.3% physical health-related problems, there were no significant differences between cases and controls. The 5Q-5D-5L index value was lower in cases of suicide risk than control patients (0.74 versus 0.85; p<0,001) (Table 1).

Table 2 shows the association between physical health problems, the different dimensions and 5Q-5D-5L scores, and suicide risk. The dimension of pain/discomfort in the health status of 5Q-5D-5L showed a significant association with suicide risk, even though after adjusting by physical health problems, mother´s education levelsand alcohol/drugs problems (OR: 2.5; CI95% 1.1-6.1). However, the EQ-5D-5L index value showed an inverse association with suicide risk (OR: 0.02; CI95% 0.002-0.2). The dimensions of mobility, self-care, and usual activities did not show any significant association (Table 2).

Regarding the performance of EQ-5D-5L for the screening of adolescente at suicide risk , the dimension pain/discomfort, at a cut-off point higher or equal to two showed a 72.2% sensibility and 65.0% specificity (AUC-ROC: 0.71; CI95% 0.58-0.84), the anxiety/depression dimension showed a 94.7% sensibility and a 75.2% specificity at the same cut-off point (AUC-ROC: 0.83; CI95% 0.75- 0.91); the EQ-5D-5L index value showed a 81% sensibility at a cut-off point lower or equal to 0.2 (AUC-ROC: 0.81; CI95% 0.72- 0.89) (Table 3). When evaluating the performance of both

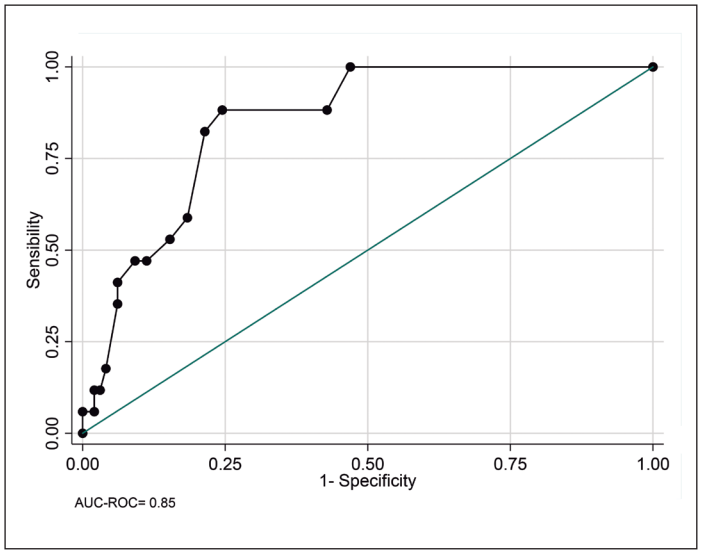

Figure 2. Area under the ROC curve (AUC-ROC) of the pain/discomfort and anxiety/depression dimension of the EQ-5D-5L questionnaire for suicide risk screening. Multivariate logistic model.

dimension together, pain/discomfort and anxiety/depression, through a multivariate logistic model, the AUC_ROC was 0.85 with a significant model adjustment (value p<0.01) (Figure2).

Discussion

Our results indicate that the health status measured by dimension pain/discomfort and by the 5Q-5D-5L index value were associated with suicide risk in the studied population; that is, the lower the valuation of the health status or the higher the pain/discomfort in the health status, the higher the risk of suicidal behavior in these adolescents. These findings where similar to those reported by Kim et al.[6] in high school Mexican adolescents; even though the quality of life was evaluated globally and not specifically related to health. The HRQL measurement through only one numeric index, as the 5Q-5D-5L index value, not only allows to measure the social valuation of the population physical and psychological health status but also to contribute economical evaluations in health[27]. In this context, the social valuation of the physical and psychological health of the adolescents was high but significantly lower in those who reported suicidal behaviors, independently of the presence of any disease.

Our results also demonstrated that the index value showed a good level of sensibility to screening adolescent at suicide risk at a population level, but a lower cut-off point than adults[6]. This capacity to discriminate was similar to the Okasha suicidality scale[17], even though it presents better specificity values (79%); and to other scales that address suicide directly, such as the Columbia-Suicide Severity Rating Scale[28], which has an 88% sensibility and 72% specificity; and the STOP-SAS[16] scale with similar values.

After including the HRQL construct in this study, it allowed to directly address not only the mental health sphere but also the physical health valuation and the self-perception of the health status of the adolescents in this study. In this regard, and how it was expected, the anxiety/depression dimension of the 5Q-5D-5L had the strongest association, even after adjusting by confounder. On the other hand, the pain/discomfort dimension also related to suicide risk, even after adjusting the physical problems/diseases report; despite having considered this last medical report by ARTS, it is not possible to dismiss the presence of physical pain[29], which can be secondary to a physiological alteration or disease, or psychological pain (mental) in the context of depression and anxyety[19,30] of this population. Apart from that, the report of having mild problems (cut-off point ≥ 2) in any or both of the previous dimensions would indirectly suggest a risk behavior in the adolescent.

This is the first time that a prevention intervention and measurement of the risk factors is performed in a commune with high rates of suicide in adolescents, in this context, our results are exploratory and require a validation in a representative sample of the population and with an epidemiologic design with temporality. Lastly, one of the advantages of using 5Q-5D-5L in the investigation is that this questionnaire does not directly address suicidality; can be self-administrated and takes approximately seven minutes to complete, and therefore, it would have a better acceptability in the commune.

Ethical responsibilities

Human Beings and animals protection: Disclosure the authors state that the procedures were followed according to the Declaration of Helsinki and the World Medical Association regarding human experimentation developed for the medical community.

Data confidentiality: The authors state that they have followed the protocols of their Center and Local regulations on the publication of patient data.

Rights to privacy and informed consent: The authors have obtained the informed consent of the patients and/or subjects referred to in the article. This document is in the possession of the correspondence author.

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Conflicts of Interest

Authors declare no conflict of interest regarding the present study.

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