

Exploration of Associations Between Deliberate Self-Poisoning and Psychiatric Disorders in Rural Sri Lanka: A Case Control Study

P. H. G. J. Pushpakumara (✉ janaka@med.rjt.ac.lk)

Rajarata University of Sri Lanka <https://orcid.org/0000-0002-8680-4397>

A. M. P. Adikari

Teaching Hospital Kurunegala

T. N. Rajapakse

University of Peradeniya Faculty of Medicine

S. U. B. Thennakoon

University of Peradeniya Faculty of Medicine

Ranil Abeysinghe

University of Peradeniya Faculty of Medicine

A. H. Dawson

The University of Sydney Central Clinical School

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Abstract

Background Psychiatric disorders are important predictors of self-harm behaviour. The present study was carried out to determine associations between DSM-IV TR Axis- I & II disorders and deliberate self poisoning (DSP) in a Sri Lankan rural agricultural district.

Methods Patients who had attempted DSP, who resided within the district were selected randomly for the study. Both the cases and age, sex and residential area matched controls were assessed for DSM-IV TR Axis- I & II disorders based on the Structured Clinical Interview for DSM-IV-TR Axis I and II Disorders (SCID I & II) conducted by a specialist psychiatrist.

Results Cases consisted of 207 (47.3%) males and 231 (52.7%) females. TR axis-I and/or TR axis-II psychiatric diagnoses was found in 89 (25.6%) of cases and 14 (3.2%) controls. Cases with a TR axis-I diagnosis were older (32 and 19 years), $p < 0.0001$. Having a depressive episode was associated with a 13 time higher risk for DSP. Being a male aged ≥ 30 years and having an alcohol use disorder carried a 21 time excess risk for DSP. A fivefold excess risk for DSP was found among 10–19 years old females with borderline personality traits.

Conclusions Depressive disorder and alcohol related disorders were significantly associated with older participants who had attempted DSP. The prevalence of psychiatric disorders among DSP in rural Sri Lanka is significantly lower than reported rates in western countries. Health and research priorities to reduce self-harm in Sri Lanka will also need to address non-psychiatric issues

Background

Deliberate self-harm (DSH) is a global health issue which is responsible for about 800 000 deaths each year.[1] Studies show that the rates of non fatal suicidal behaviours is 10 to 40 times greater than suicide. [2, 3] Rural areas of Sri Lanka (SL) have had a persistently high incidence of deliberate self-poisoning (DSP) since the early 1980s.[4–6]

A major psychiatric diagnosis is one predictor of both DSH and subsequent suicide.[7] Moreover, personality traits [8, 9] and personality disorders have been identified as risk factors for DSH.[10] The high rates of self-harm in SL are multifactorial, with both cultural and environmental factors playing a role. The contribution of psychiatric disorders to DSH is important in health care planning but has not been described in detail. Most previous Sri Lankan studies of psychiatric disorders in DSH have been based upon self-report, use of screening tools or review of medical records. A systematic review of studies of self-harm in Sri Lanka [11] did not identify any studies that investigated possible associations between non-fatal self-poisoning and psychiatric conditions such as anxiety disorders, impulse control disorders, or bipolar disorder.

The present study was designed to determine associations between DSM-IV TR Axis- I & II disorders, assessed using the Structured Clinical Interview for DSM-IV-TR Axis I and II Disorders (SCID I & II) by a

specialist psychiatrist, and deliberate self poisoning (DSP) in the Kurunegala District (KD), Sri Lanka.

Methods

Study design and study setting

An age, sex and residential divisional secretariat division matched case control study was conducted among randomly selected patients who were admitted to Teaching Hospital Kurunegala (THK) over a period of eighteen months, from 1st July 2011 to 31st December 2013, as a sub study of the study titled "A clustered randomise control trial of educational interventions on treatment of patients with acute poisoning in rural Asian hospitals" (Sri Lanka Clinical Trial Registry No. SLCTR/2010/008). THK is the main referral center for the 1.6 million population of the district,[12] and receives more than 53% of the total deliberate self-poisoning cases of the district.[6]

Procedure

Sample and sampling:

Sample size was calculated for hypothesis testing for an odds ratio, with level of 5% significance and two-sided test with power of 90%. The sample size was calculated to detect a condition which has a 6% prevalence among the non-DSP population and minimum odds of two or a condition which has a 1% prevalence among non-DSP population and minimum odds of 3.75.[13] Four hundred and thirty-eight patients who had attempted DSP, who reside within the Kurunegala District, were selected as cases randomly from blocks of seven consecutively admitted consenting DSP patients, aged 10 years and above, using a computer program. The same number of age, sex and residential divisional secretariat division matched individuals, who have no history of self-harm, were randomly selected as controls from patients presenting to the Out Patient Department (OPD), THK.

Study Instruments And Data Collection:

A consultant psychiatrist interviewed all participants (cases and controls) using the SCID I & II to diagnose any major psychiatric disorders and/or personality disorders (DSM-IV-TR Axis I and II disorders). Collateral history was obtained from family members. The diagnoses were recorded according to DSM-IV. [14] Interviews were conducted when the participants were medically stable, usually the day before the day of discharge in cases, and after the OPD consultation in controls. Details related to the previous consultations of health professional for the symptoms related to the diagnosis were collected through an interview with the patient and relation, and confirmed by examination of previous medical records.

Data analysis

Data were entered to a Microsoft Excel spreadsheet and analyzed using IBM SPSS Statistics for Windows, Version 23.0. Medians, quartiles and percentages with a confidence interval at 95% significant level were calculated to describe variables. Odds ratios and confidence interval at 95% significant level were calculated for categorical data.

Role Of The Funding Source

The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Results

A total of 1954 and 2049 persons were admitted for DSP in 2011 and 2012 respectively. The sample consisted of 207 (47.3%) males and 231 (52.7%) females, ranging from 12 to 70 years of age (median 20, IQR 17–27). More than one third (37%) of males and more than half (53.7%) of females were aged below 20 years. Males were older than females, and the median age of males was 22 years (IQR 18–32) and of females was 19 years (IQR 17–24), respectively, $p < 0.0001$ (Mann-Whitney U test).

A TR axis-I and/or TR axis-II psychiatric diagnosis was present in 89 (25.6%, 95% CI 21.5–29.7%) of cases and 14 (3.2%, 95% CI 1.5–4.8%) controls. More than one psychiatric condition was found in 14 (3.2%, CI 1.5–4.8%) of cases and in none of the controls. Having a psychiatric disorder was associated with a 7.7 times higher risk for DSP (OR 7.7, 95% CI 4.3–13.8, $p < 0.0001$ Chi-square test). Cases who had at least one TR axis-I diagnosis (median age 32 years, IQR 20.75–43) were older than those who had no psychiatric disorder (median age 19 years, IQR 17–24), $p < 0.0001$ (Mann-Whitney U test). The prevalence of a depressive episode among patients who presented with DSP was 8.4% (95% CI 3.5–13.6%). Suffering from a depressive episode was shown to have a 13 times excess risk for DSP (OR 13.4, 95% CI 4.1–43.7, $p < 0.0001$ Chi-square test). A large majority, 76.4% (95% CI 68.9–83.9) had never sought medical care for the symptoms related to their psychiatric diagnosis (Table 1).

Table 1
Presence of TR axis-I and II psychiatric disorders among cases

Diagnosis	n (%; 95% CI)	Newly diagnosed: n (%; 95% CI)
Alcohol Dependence	9 (2.0, 0.7–3.3)	7 (77.8, 63.9–91.6)
Alcohol abuse	13 (3.0, 1.4–4.6)	11 (84.6, 78.2–90.9)
Poly-substance dependence	1 (0.2, -0.2–0.6)	1 (100)
Mild Depressive disorder, single episode	5 (1.1, 0.1–2.0)	5 (100)
Moderate Depressive disorder, single episode	12 (2.7, 1.2–4.2)	9 (75, 67.3–82.6)
Severe Depressive disorder without psychotic features, single episode	13 (3.0, 1.4–4.6)	11 (84.6, 78.2–90.9)
Recurrent Moderate Depressive disorder	3 (0.7, -0.1–1.5)	0 (0)
Recurrent Severe Depressive disorder without psychotic features	2 (0.5, -0.2–1.2)	1 (50, 14.6–85.4)
Recurrent Severe Depressive disorder with psychotic features	1 (0.2, -0.2–0.6)	1 (100)
Bipolar Affective Disorder-most recent episode moderate depression	1 (0.2, -0.2–0.6)	1 (100)
Schizophrenia	2 (0.4, 2.1–5.8)	0 (0)
Acute Stress Disorder	1 (0.2, -0.2–0.6)	1 (100)
Specific phobia	2 (0.5, -0.2–1.2)	1 (50, 14.6–85.4)
Moderate Mental Retardation	1 (0.2, -0.2–0.6)	0 (0)
Borderline Personality Disorder or traits	32 (7.3, 4.5–9.7)	25 (78.1, 70.8–85.4)
Antisocial Personality Disorder or traits	3 (0.7, -0.1–1.5)	2 (66.7, 39.5–93.9)
Narcissistic Personality Disorder or traits	1 (0.2, -0.2–0.6)	1 (100)
Depressive Personality Disorder or traits	2 (0.5, -0.2–1.2)	0 (0)
Obsessive Compulsive Personality Disorder or traits	0 (0)	0

Diagnosis	n (% , 95% CI)	Newly diagnosed: n (% , 95% CI)
Any TR axis I or II Disorder	89 (25.6, 21.5–29.7)	68 (76.4, 68.9–83.9)

Alcohol Use Disorders

Several studies have shown strong associations between alcohol and suicidal behavior in Sri Lanka. [38, 39]. The marked male predominance of alcohol use in this study, which has also been reported by previous Sri Lankan studies and rest of the Asia, [40] reflects the socio-cultural norms of alcohol use in this country. In this study the presence of an alcohol use disorder was associated with a 21 times increased risk of DSP. This was the most significant risk factor associated with DSP for males, which highlights the importance of alcohol use disorders in DSP behaviour [15]. This is supported by findings from other studies in Sri Lanka.[16, 41, 42]. Interpersonal conflict, and domestic, physical, sexual or psychological abuse associated with alcohol misuse are likely to contribute to DSH behavior [41], both in the person who misuses alcohol as well as their close family members. Alcohol use and alcohol related domestic violence among males is associated with increased risk of psychiatric disorders among their partners and wives [43]. Alcohol use disorders are also associated with increased risk of depression and suicidal behaviour among those who consume alcohol.[44] A recent study has proposed a model to explain suicide proneness in alcohol use through alcohol-related problems; negative life events and depressive symptoms, and it is likely that multiple complex factors contribute to the increased risk of self-harm seen in those with alcohol use disorders in this study. [45]

Though the reported prevalence of other substance dependence is very low in the present study, a higher prevalence of cannabis has been reported in previous studies [46][47] specially among adolescents. [48] Analysis of data published by Sri Lanka Police reported that, 2664 (6.3% of all suicide) suicides had concurrent psychoactive substance use, in the 2005 to 2015 ten year period.[49]

Table 2

Presence of alcohol use disorder among cases and controls by age group

Age Group (years)	Male		OR* (95% CI)	Female	
	n, % (95% CI) having alcohol use disorder			n, % (95% CI) having alcohol use disorder	
	Case	Control	p value**	Case	Control
10-19	2, 2.6 (0.8-4.4)	1, 1.3 (0.01-2.6)	2.0 (0.18 - 22.84), 1.0	1, 0.8 (0.003-1.6)	1, 0.8 (0.003-1.6)
20-29	3, 4.2 (1.8-6.6)	1, 1.4 (0.01-2.8)	3.1 (0.31 - 30.44), 0.62	0	1, 1.3 (0.01-2.7)
> = 30	16, 26.7 (20.9-32.4)	1, 1.7 (0.01-3.3)	21.4 (2.74 - 168.0), < 0.0001	0	0

* unadjusted odds ratios

** p value of Fisher's exact test

Depressive Disorders

The highest proportion of depressive episodes was found in the > = 30 year age group, with the gender distribution being 20% among males and 28% among females. Cases who presented with a current episode of depression were older (median age 35 years, IQR 20.5–45) than the cases who had no depressive episode (median age 20 years, IQR 17–25), $p < 0.0001$ (Mann-Whitney U test). Females aged > = 30 years with a current episode of depression had a higher risk for DSP (OR 26.3, 95% CI 1.5–474.5, $p = 0.002$, Fisher's exact test) compared to same aged males having a current episode of depression (OR 4.7, 95% CI 1.3–17.8, $p = 0.02$, Fisher's exact test). Nearly one fourth, 24.3% (95% CI 16.7–31.9) of those who were depressed had sought medical care for a depressive disorder prior to the event.

Table 3
Presence of depressive episode among cases and controls by age group

Age Group (years)	Male		Female			
	n, % (95% CI) having depressive episode	OR* (95% CI)	n, % (95% CI) having depressive episode	OR* (95% CI)	p value**	
	Case	Control	Case	Control	p value**	
10–19	2, 2.6 (0.8–4.4)	0	5.1 (0.2 to 108.8)	4, 3.2 (1.6–4.8)	0	9.3 (0.5 to 174.7)
			0.49			0.12
20–29	5, 7.0 (4.0–10.1)	0	11.8 (0.6 to 218.2)	5, 6.7 (3.8–9.5)	0	11.8 (0.6 to 217.1)
			0.058			0.058
> = 30	12, 20.0 (14.8–25.2)	3, 5.0 (2.2–7.8)	4.7 (1.3 to 17.8)	9, 28.1 (20.2–36.1)	0	26.3 (1.5 to 474.5)
			0.02			0.002

* unadjusted odds ratios ** p value of Fisher's exact test

Borderline Personality Disorder (bpd) And Borderline Personality Traits (bpt)

The prevalence of BPD or BPT among persons who attempted DSP did not significantly differ between age groups. Similarly, there was no difference in the median age of patients diagnosed to have and excluded BPD or BPT. The median age of those with BPD or BPT was 20.5 years (IQR 16.25 to 30.00), and the median age of others was 20.0 years (IQR 17.0 to 26.0), $p = 0.8$ (Mann-Whitney U test). A fivefold excess risk for DSP was found among 10–19 years old females with BPT (OR 5.3, 95% CI 1.1–24.9, $p = 0.03$, Fisher's exact test). However, there was no significant association of BPD with DSP. Slightly over one fifth of patients (21.8%, 95% CI 14.5–29.2) had sought medical care for symptoms related to the personality disorder prior to the event.

Table 4
Presence of BPD or BPT among cases and controls by age group

Age Group (years)	Male		Female			
	n, % (95% CI) having BPD	OR* (95% CI) p value**	n, % (95% CI) having BPD		OR* (95% CI) p value**	
	Case	Control	Case	Control		
10–19 [#]	5, 6.5 (3.7–9.3)	1, 1.3 (0.01–2.6)	5.3 (0.6 to 46.3) 0.21	10, 8.1 (5.6–10.5)	0	5.3 (1.1 to 24.9) 0.03
20–29 ^{##}	3, 4.2 (1.8–6.6)	0	7.3 (0.4 to 144.2) 0.24	5, 6.7 (3.8–9.5)	0	11.8 (0.6 to 217.1) 0.058
≥ 30 ^{##}	4, 6.7 (3.4–9.9)	0	9.6 (0.5 to 183.2) 0.12	5, 15.6 (9.2–22.0)	1, 3.1 (0.05–6.2)	5.7 (0.6 to 52.3) 0.19

* unadjusted odds ratios, ** p value of Fisher's exact test, # BPT, ## BPD

Discussion

Rates of psychiatric morbidity

This is the first large study on DSP in Sri Lanka which used the DSM-IV based SCID interview conducted by a specialist in psychiatry. The prevalence of a psychiatric diagnosis among persons who have attempted DSP in the Kurunegala District in this study (25.6%) is similar to the observations of a cross sectional study conducted in central part of the country, (32.1%).[15] Other studies, conducted in different parts of the country including in areas socioeconomically similar to the KD, have reported relatively lower prevalence.[16–19] This variation may be explained by the difference in sub-cultures and under-diagnosis or over-diagnosis of psychiatric disorders due differences in methodology and diagnostic tools used to elicit psychiatric disorders.[20]

The previous reported prevalence of psychiatric diagnoses among those who attempted suicide have been lower among Asians [21] compared to those in western countries, where some studies reported at least one Axis I disorder in 98% of cases, [22–24] The possibility of underestimating psychiatric disorders due to the stigma of mental illness, methodological limitations, as well as limited treatment resources in developing countries have been proposed to explain these variations.[25] A recent systematic review has

highlighted the scarcity of high-quality research and high level of heterogeneity of reported prevalence in low and middle income countries. [26] In this study, in order to minimize these bias, SCID based clinical interviews were conducted by specialists in psychiatry, to assess for the presence of psychiatric disorders. Despite this, the findings of this study confirm a lower prevalence of psychiatric disorders among those who have attempted DSP, compared to rates reported from the west. This suggests the involvement of other non-psychiatric factors contributing towards DSP, particularly in the younger age groups. This finding may also partially explain the lower repetition rates of self-harm, observed in Sri Lanka.[6, 27] In this Sri Lankan context a greater focus on non-psychiatric and medical interventions may be appropriate. In rural Sri Lanka, self poisoning seems to be the preferred method of dealing with difficult situations [28]. Inability to cope with negative feelings, emotions and urges and poor decision making skills [29] and lack of skills necessary to deal with problems [15] have been identified as important in deliberate self-harm. Training on life skills including coping skills as a preventive strategy for suicide and attempted suicide maybe an area of future research worth exploring. [30–33]

Psychiatric Morbidity And Risk Of Dsh

Depression

Of the psychiatric disorders, mood disorders have been commonly [34] and consistently [35] associated with suicidal behavior. The present study, as well as a few other studies conducted previously in Sri Lanka have reported depressive disorder as the most commonly seen psychiatric disorder among those who attempt DSH. However, compared to the present prevalence of 8.4%, most of the previous studies have reported a higher prevalence in depression among DSH, ranging from 13.4–53.7% [15, 17, 36, 37]. In contrast, one study conducted in a socioeconomically similar area to this study found no significant association between DSP and depressive disorder. [16] Differences of diagnostic procedures and contextual variation may explain the observed variation.

Bpd And Bpt

Personality disorders is another significant risk factor associated with suicidal behavior.[10] At least three-quarters of patients with BPD engage in suicidal behavior.[50] A study conducted in central part of the SL also cited that personality disorders, especially impulsive personality traits, were common among DSH patients.[15] In this study in the KD, 8.7% of who have attempted DSP were diagnosed as a having BPD or BPD traits. BPD or BPT alone associated with 7.3% of DSH events. However, the absence of a significant association between DSP and BPD maybe partially explained by the apparent relatively lower prevalence of BPD in Asians.[51]

Variation Of Psychiatric Morbidity With Age

It has been suggested that there may be significant differences between younger and older people who have suicide behaviour.[52] Sri Lankan and international researchers have described two broad categories of persons who attempt DSH – a larger proportion of younger people, usually without psychiatric disorders, in response to family or social conflicts; and less commonly older persons, who often have an often undiagnosed major psychiatric disorder, especially depression, and who may have an ongoing high risk of suicide.[15] A similar pattern of DSP was observed in the present study. Substance misuse and depressive disorders were the significant correlates of the self-harm behaviour in adults older than 30 years of age, in this study. This is a key finding – although a majority of those who attempt DSP are young (aged below 30 years), older persons who attempt DSP were significantly more likely to have a psychiatric disorder and probable high suicide risk. Ideally all persons who are admitted for management for DSH should be screened for risk factors such as depression and alcohol use disorders – but this is particularly important in older persons (over 30 years). Establishing a method of screening at least for all older persons after DSH, and further assessment as needed, should be part of routine practice. Healthcare practitioners should also be educated about the ‘red flags’ to identify high risk persons presenting with DSP – for example older age, previous attempts, and psychiatric morbidity. DSP among young people in this study was less likely to be associated with psychiatric morbidity. DSH among adolescents and young adults has been associated with acute emotional distress, interpersonal conflicts with close ‘others’ (such as parents and partners) and has even been described as a learnt maladaptive coping mechanism in challenging situations. [28, 53-55] Therefore, in-depth exploration of association with life skills, which is a less explored entity in suicidology,[56] is important. Innovative methods to help young people develop problem solving and interpersonal skills should be explored and developed. Community programs to help parents understand and respond to teenage children more appropriately is another challenging but important area to be explored.

Conclusions

Depressive disorder and alcohol related disorders were significant predictors of suicidal behavior by self-poisoning. A majority of those with psychiatric disorders were only diagnosed after the event of DSP. TR Axis-I psychiatric disorders are significantly associated with older age. The marked association between alcohol use disorders and DSP among males in this study highlights the urgent need for culturally suited effective strategies to minimize alcohol use disorders in the community, including brief interventions and identification of high risk individuals with alcohol use disorders for interventions. However, the prevalence of psychiatric disorders among DSP in rural Sri Lanka is markedly low compared to rates reported from western countries. Further research is warranted to investigate whether DSH is the same phenomenon across the life cycle or whether it has a different meaning and risk factors in adolescence and young adults compared to older people.

List Of Abbreviations

Deliberate self-harm (DSH)

Deliberate self poisoning (DSP)

Kurunegala District (KD)

Randomise Control Trial (RCT)

Teaching Hospital Kurunegala (THK)

Declarations

Ethics approval and consent to participate

Ethics approval for “A clustered RCT of educational interventions on treatment of patients with acute poisoning in rural Asian hospitals” was obtained from Ethical Review Committee, e Faculty of Medicine, University of Peradeniya (EC/2007/98, https://med.pdn.ac.lk/admin/committees_Ethical.html). Ethical approval for the sub study was obtained from the Ethics Review Committee, Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka (8/3/2011, <http://www.rjt.ac.lk/med/faculty-structure/committees/erc>). Informed written consent was obtained from the participants for all the interviews and to obtain the collateral history form a third party. Ascent form the participant and consent from a parent or guardian were taken for minors, aged below 16 years.

Consent for publication

Not Applicable

Availability of data and materials

Data are available from study authors on request.

Competing interests

We declare no competing interests.

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Authors' contributions

Conceptualization: P.H.G.J. Pushpakumara, Ranil Abeysinghe, A.H. Dawson.

Data curation: P.H.G.J. Pushpakumara, A.M.P. Adikari

Formal analysis: P.H.G.J. Pushpakumara, S.U.B. Thennakoon

Supervision: Ranil Abeysinghe, A.H. Dawson, S.U.B. Thennakoon

Writing of the original draft: P.H.G.J. Pushpakumara.

Contribution & editing of the manuscript: T.N. Rajapakse, A.H. Dawson, P.H.G.J. Pushpakumara.

Except A.M.P. Adikari, who has passed away, all the other authors have read and approved the manuscript.

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Figures

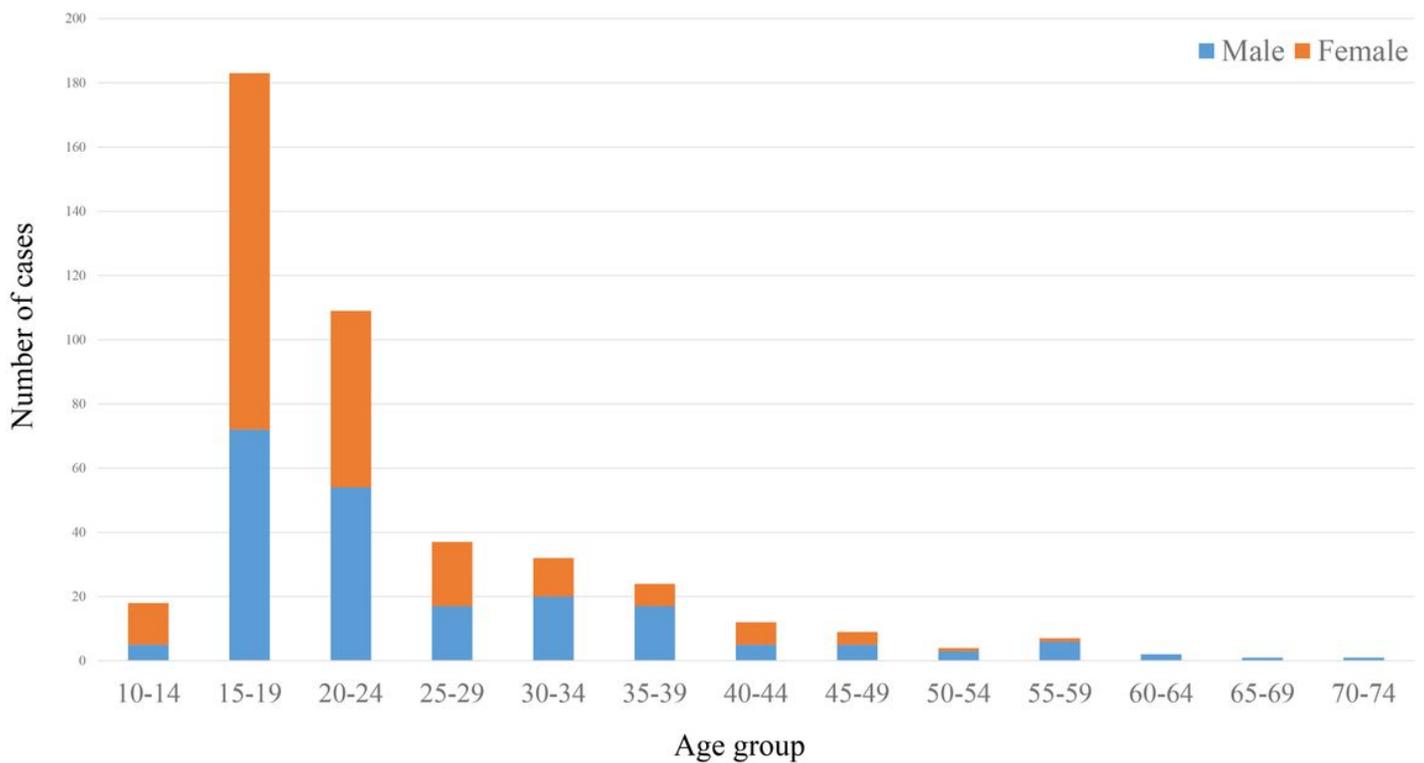


Figure 1

Number of cases by sex and age The sample consisted of 47.3% males and 52.7% females. 37% of males and 53.7% of females were aged below 20 years. About one third of the sample was in 20-29 year age group (male: 34.1% and female: 32.5%).