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ORIGINAL ARTICLE

Non-Accidental Poisoning among Children in Rural Sri Lanka: A Two-Year Cross Sectional Study

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Abstract

Background: Non-accidental poisoning in the paediatric age group is uncommon and international literature on this subject is limited. There are no Sri Lankan paediatric studies on non-accidental poisoning to date. The objective of the current study was to explore the predisposing factors and profile of children less than 12 years in rural Sri Lanka who had non-accidental poisoning.
Method: This cross-sectional study was conducted at Anuradhapura teaching hospital for two years (from February 2012 to January 2014) involving all children below 12 years and presented with either a history of acute non-accidental self-poisoning or non-accidental poisoning by another person. Quantitative data were collected using a structured questionnaire and qualitative data to explore the background socio-cultural factors were collected using focused group discussions. Both quantitative and qualitative data were analysed separately in the two groups.
Results: Nineteen children with non-accidental poisoning were recruited among 383 acute poisoning admissions over two years. The majority of children were male – 13 (68.4%). All children who had non-accidental self-poisoning were at least eight years of age while the mean age of children poisoned by another person was 4.6 years. Children mostly ingested pesticides (9/14- 64.3%) followed by plant poisons and medicinal poisons. No child was reported to have ingested household chemicals including kerosene oil or miscellaneous substances intentionally. Children with non-accidental self-poisoning often had acute psychological distress and an immediate preceding event which resulted in the poisoning event. Verbal abuse by parents, poor family relationships, psychiatric disorders in children and emotional disturbances were often predisposing factors. Four children had morbidity secondary to aspiration pneumonia, respiratory arrest, and cardiac arrhythmias. Case fatality rate was 14.3% among children with non-accidental self-poisoning. Children with non-accidental poisoning by another person often did not have acute psychological distress prior to the poisoning event. When the perpetrator was one of the parents, those families had major disruptions in family relationships and functioning.
Conclusion: Non-accidental poisoning in paediatric age could be either non-accidental self-poisoning or non-accidental poisoning by another person. The risk factors for the two types of non-accidental poisonings are different and multitudinous. These predisposing factors need to be further evaluated through community-based studies.

Keywords: Children; Poisoning; Sri Lanka

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INTRODUCTION

Non-accidental poisoning in children is not common and the majority of poisoning in paediatric age group occurs by accidental ingestion. Therefore, literature on childhood non-accidental poisoning is scarce. Though there are enough studies on deliberate self- poisoning among adolescent age group, only few studies have concentrated on children below the age of 12 years even in wider international literature (1). There are currently no Sri Lankan paediatric studies on this topic. The factors associated with non-accidental self-poisoning in pre-pubertal children may not be the same as those in older adolescents. Children in the pre-pubertal age get more parental attention. They are less likely to have the cognitive and practical capacity to plan and carry out the act of non-accidental self-poisoning (2). It is important to identify children with non-accidental poisoning early because there is a higher risk for repetition and suicide in later life (3).

There are quality studies done on adult population in Sri Lanka to identify patterns of intentional poisoning. One such study which assessed acute deliberate self-poisoning in the Southern Province of Sri Lanka concluded pesticides and Oleander as the common agents used for adult poisoning (4). Pesticide poisoning was listed as the 6th common cause of hospital deaths in Sri Lanka in 1990s (5). Even now statistics from Sri Lanka show an alarmingly high rate of acute non-accidental poisoning among adult population (6).

Studies on children with non-accidental poisoning in

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international literature are limited. An Indian study (1991) on poisoning among children below 12 years reported the incidence of suicidal poisoning as 0.4% of all cases of poisoning (7). The majority of non-accidental poisoning in western world occurred in association with FII (fabricated or induced illness) by care takers in 1990's and carried a high mortality. Diagnosis was often delayed with severe consequences taken by the child victim (8). Recent European study reported a higher percentage of children ingesting medicinal poisons during suicidal attempts (9).

There is evidence to suggest that both psychological characteristics and stressful life events are contributory factors in non-accidental poisoning among children and adolescents (1). In one study (Madge et al.), increased severity of self-harm history was associated with greater depression, anxiety, impulsivity and low self-esteem among children and adolescents (10). Female gender, higher impulsivity, experiencing the suicide or self-harm of others, physical or sexual abuse and worries about sexual orientation were also associated with deliberate self-harm. However, there exist clear knowledge gaps with regard to contributory psychological factors of non-accidental poisoning among children. As non-accidental poisoning is commoner among adults in North Central Province of Sri Lanka compared to other provinces in Sri Lanka, negative family experiences/ parental influences may be contributory to a child's thought of committing non-accidental poisoning. Identification of these parameters is not easy and need both quantitative and qualitative assessments of such children and their parents. In this paper, the authors have explored the predisposing factors and profiles of children from rural Sri Lanka who experienced non-accidental poisoning.

METHODS

Study setting

This cross-sectional study was based in North Central Province (NCP) of Sri Lanka which accommodates a predominantly rural population. The study was conducted at Anuradhapura teaching hospital over a two-year period from February 2012 to January 2014 involving all children who were below 12 years and presented with a history of non-accidental poisoning.

Participants

The children who deliberately self- ingested the poison as well as those who were given the poison forcefully by another person were included in the study. The two groups were recruited separately to the study given the likely variability in predisposing factors in each group of children. Children with acute accidental poisoning and food poisoning, snake envenomation, allergic reactions and adverse drug reactions which can be considered in the purview of toxicology were excluded from the study. Children with doubtful poisoning where there was no clear etiology were also excluded from the study.

Study design and instruments

Study design was both quantitative and qualitative. Quantitative data were collected using an interviewer administered, structured questionnaire. The questionnaire was not piloted given the limited sample size. Instead, the questionnaire was subjected to expert peer review to ensure clarity and validity.

In order to perform an in-depth analysis of predisposing risk factors of non-accidental poisoning, a qualitative study was conducted recruiting all children with non-accidental poisoning and their parents at Anuradhapura teaching hospital. Data collection was done prospectively over two years via focused group discussions (FGD). Nineteen parents and thirteen children participated in the qualitative study. A theme guide was used to direct FGD and the responses from care givers and children were recorded as field notes. Children and their parents were interviewed together and separately and allowed to narrate their stories and points of view until a thematic saturation was achieved. The information assimilated though FGDs were used to build up the case series.

Quantitative study collected information regarding age, sex, family environment, school environment, stresses and nature of poisoning. "Acute stress factors" which was one variable in quantitative study was defined for the study based on definitions used in similar international studies (11). The researchers understood that stress is present when at least one of the following caused parental concern; serious illness or bereavement within family or among close relations, mother pregnant, economic strains, lack of support from extended family, harmful alcohol use related problems, marital conflicts, single parent or one parent away from home, recently moved house, anxiety or depression in a parent, a working mother and another child less than one year. Parent's own and subjective revelation of stress secondary to any other factor was also considered given the researcher has understood the fact in focused group discussions. Depending on the source, stress factors were again grouped as family stress (death of a parent, mental illness in a parent, financial problems, conflicts among parents, parental alcoholism, divorce and separation), parent stress (punitive parent, conflict with parents), school stress (examination failures, poor academic achievement, change of school, general adjustment problems at school), peer stress (bullying by classmates, being ignored by friends, conflicts with class mates) and teacher stress (punishment, adverse comments, being ignored) and each child was evaluated for presence or absence of aforementioned risk factors.

DSM- IV (diagnostic and statistical manual of mental disorders) diagnostic classification was used to identify clinical features of mental disorders in children with deliberate poisoning.

Data collection

Data were collected from the caregivers of children who met inclusion criteria. Both parents were interviewed in most encounters and other caregivers were interviewed only when parents were not available to participate in the study. Only children who were healthy enough to participate in focused group discussions were recruited to the study (13/19 children). All data collections from caregivers and children were done by the principal investigator himself to minimize interviewer bias. Interviews with the caregivers were conducted on the same day of admission to minimize possible recall bias. All data were analysed using SPSS version 19.0.

Data reliability and auditing

Data collections in all components of the current study were subjected to independent audit and close monitoring by South Asian Clinical Toxicology Research Collaboration (SACTRC) and the investigators of the study.

Ethical approval

Ethical clearance for the study was issued by ethical review committees, faculty of medicine, University of Kelaniya and Rajarata University of Sri Lanka. Written informed consent was obtained from parents or guardians of children participating.

RESULTS

There had been nineteen incidents of non-accidental poisoning out of 383 cases with acute paediatric poisoning (19/383, 4.9% of total poisoning events) during the two-year study period. Table 1 describes the nature of intentional poisoning in children.

Table 1. Nature of intentional poisoning among children

	Nature of poisoning	Number (n=19)	Percentage
1.	Intentional self-poisoning	14	73.6
2.	Forcefully given by a care giver	4	21.0
3.	Forcefully given by a colleague	1	5.3

Children with non-accidental self-poisoning

The majority of children were male – 8/14 (57.1%) and all children who committed non-accidental self-poisoning were at least eight years of age. Eight (57.1%) fathers either had received only primary education or no schooling at all. Six (42.9 %) mothers had received only primary education. 21.4% of parents belonged to farming community.

Children mostly ingested pesticides (9/14- 64.3%) followed by plant poisons (3/14- 21.4 per cent), and medicinal poisons (2, 14.2%). Notably, no child was reported to have ingested household chemicals including kerosene oil or miscellaneous substances intentionally. The commonest poisoning substances were organophosphate pesticides (6, 42.9%) and oleander (2, 14.3%). Seven (50 per cent) children also had a delayed presentation (delay of more than two hours from the time of poisoning event). All (100%) children were transferred to TH Anuradhapura from regional hospitals in NCP and there were no direct admissions. Four children (28.5 per cent) had morbidity secondary to aspiration pneumonia, respiratory arrest, and cardiac arrhythmias. Case fatality rate was 14.3% (2/14) and the reported deaths were secondary to self-ingestion of organophosphate pesticides and oleander.

"Acute stress factors" as defined in methodology, were present in 93% (13/14) of children who had intentional self-poisoning. 57% of children (8/14) who had self-poisoning were having family related stresses. 21% (3/14) had peer related stresses while 14% (2/14) had sibling related stresses. Only one child (7%) was previously diagnosed with a psychiatric illness. However, three other children showed

Table 2. Profile of intentional poisoning cases

	Age yrs.	Sex	Poison	Perpetrator	Background as revealed in FGD
1	12	M	Fungicide	-	Verbal abuse by parents
2	10	M	Detergent	A peer	Ragging
3	8	F	Herbicide	-	Emotional disturbance
4	11	F	Organophosphate	-	Emotional disturbance
5	2	M	Beer	Father	Parental substance abuse
6	11	M	Nifedipine	-	Diagnosed child with Schizophrenia
7	11	F	Oleander	-	Verbal abuse by father
8	10	M	Tramadol	-	Stress related to academic achievements and verbal abuse by mother
9	8	M	Oleander	-	Poor family relationships
10	11	M	Oleander	-	Bullied by peers
11	11	M	Pesticides	-	Poor family relationships
12	12	F	Organophosphate	-	Verbal abuse by step-father
13	11	F	Organophosphate	-	Verbal abuse by parents
14	3	M	Glyosphosphate	Father	Poor family relationships
15	12	M	Pyrinex	-	Verbal abuse by parents
16	12	F	Organophosphate	-	Poor family relationships
17	4	M	Carbamate	Mother	Poor family relationships
18	11	M	Organophosphate	-	Separation from mother
19	4	M	Oleander	Father	Parental substance abuse

clinical features of psychiatric illnesses such as with a psychiatric illness. However, three other children showed clinical features of psychiatric illnesses such as depressive disorder and attention deficit hyperactivity disorder in compliance with DSM-IV diagnostic classification. All parents (100%) of those children with non-accidental self-poisoning based on their subjective understanding admitted that their child had acute psychological distress immediately prior to the poisoning event. 86% (12/14) had impulsive behaviour according to their parents. Table 2 elucidates contributory psycho-social backgrounds of children with intentional poisoning along with their demographic information and poisoning agents.

It was revealed through FGDs that parental substance abuse, peer-related stresses, financial problems in the family and parental disharmony played a major role in intentional poisoning of children. Parents of children with non-accidental self-poisoning were less educated and practiced poor parenting styles in higher percentages.

The qualitative study further revealed that most children demonstrated the self-injurious behaviour as a way of communicating a cry of pain or a cry of help. All children were having acute psychological distress at the time of the poisoning event. Verbal abuse by one of the parents had been the immediate preceding event in three cases of deliberate self-poisoning by children. One child was diagnosed with schizophrenia and was on treatment at the time of intoxication. The researcher observed one child ingesting the poison soon after his mother leaving to Middle-East as a housemaid and another child ingesting the poison after getting to know that his parents are heading for a divorce. Two children ingested the poison following a quarrel with the best friend and after being bullied by a colleague of the same age. In one child, the immediate preceding event was not revealed by the qualitative assessment and the child had clinical features meeting the diagnostic criteria of depressive disorder.

On the contrary, conflicts with teachers, major examination failures and death of parents were less contributory to intentional poisoning in this population.

Children with non-accidental poisoning by another person

Five children were recruited over two-year study period. The mean age was 4.6 years (ranging 2 – 10 years). All five children were male. Poisoning agents used by the perpetrator were pesticides (2, 40%), household poisons (2, 40%) and plant poisons (1, 20%). The perpetrator had been father in 60% (3 cases), mother in 20% (1 case) and a colleague of the same age in 20% (1 case) of poisoning events.

Three (60%) fathers either had received only primary education or no schooling at all. Two (40%) mothers had received only primary education. 80% (4/5) of parents belonged to farming community. Three (60%) of children also had a delayed presentation (delay of more than two hours from the time of poisoning event). Four (80%) children were transferred to TH Anuradhapura from regional hospitals in NCP and direct admissions constituted only one child. One child (20%) had morbidity secondary to aspiration pneumonia. Case fatality rate was 0%. None of the children had clinical features meeting diagnostic criteria of a psychiatric illness.

The qualitative evaluation of children and their parents/ guardians revealed that substance abuse in father and marital disharmony are the key factors that lead to the poisoning event in their children. In the case where the child was given the poison by his mother, the mother herself self-ingested a lethal dose of the same poison being unable to tolerate the abusive treatment by her partner who was a drug addict and a problem drinker. In the case where the child was given beer forcefully by his father, the father himself was intoxicated at the time of non-accidental poisoning and the father had been a problem drinker. In the event where the child was poisoned with glyosphosphate, the father had attempted to commit suicide by hanging three months earlier and the main reason had been unsatisfactory marital relationship. In the event where the father poisoned his child with oleander, the child's mother and grandmother were also poisoned. Oleander was added to curry without the action having been noticed. The perpetrator had never schooled and was a drug addict and a problem drinker. In case where the child was given the poison by a colleague of the same age, the child had been healthy and without any disrupted family relationships. The information regarding the colleague was not available.

DISCUSSION

In this study, we observed that majority of children who intentionally self-ingested the poison belonged to 10- 12 years age category. This may be explained by the increase in risk taking behaviour displayed by adolescents as reported by other studies (12).

Previous Sri Lankan studies have reported pesticides and oleander as the commonest substances used for intentional adult poisoning (4). The current study observed similar findings with pesticides and plants together accounting for 79% of non-accidental self-poisoning events and organophosphates and oleander being the commonest substances used in children aged less than 12 years. Mortality rate was 47 fold higher among children with non-accidental self- poisoning (14.3%) compared to unintentional poisoning (0.3%) in the same study setting (13).

Non-accidental self-poisoning in children below 12 years is reported to be very rare (14, 15). Children who commit non-accidental self-poisoning are shown to have more delinquency, school problems, previous self-poisoning, running away, and previous negative experiences of "Care" (16). Their families showed more evidence of marital failure, previous psychiatric disorder, self-poisoning, and delinquency, than were present in control families(16). In the current study, children who become victims of non-accidental poisoning by another person often did not have acute psychological distress and sharply contrasted with children who committed intentional self-poisoning. However, major disruptions in family and marital relationships were similarly observed among children who were poisoned by their own caregivers.

The impact of parental substance abuse on non-accidental injuries is potentially significant (17). Harmful use of alcohol leads to domestic conflicts, marital disharmony, economic stresses, parental psychological stresses, social stigma, and

neglect of children (17). All these factors lead to poor parent-child relationships and make the child vulnerable to intentional harm (18). The current study observed that parental substance abuse can lead to non-accidental poisoning of children by their parents. The same risk factor can also indirectly predispose to non-accidental self-poisoning in children less than 12 years since one of the major causes for poor family relationships had been substance abuse in a parent. The study did not observe any child who was using alcohol by themselves.

The current study further observed that family disruptions had a major influence as compared to school, teacher or exam related stresses. With regard to stress factors in the family of children with non-accidental self-poisoning, the study observed that conflict with parents, financial stresses, parental disharmony, and psychiatric illness in a parent were present in 8/14 (58%), 9/14 (64%), 5/14 (35%), and 1/14 (7%) respectively. The same risk factors were observed though in lesser proportions in South Asian studies (1). The variables evaluated under school-related risk factors in current study included academic problems (4/14, 28%), examination failure (1/14, 7%), peer stress (6/14, 43%) and conflicts with teachers (2/14, 14%). These risk factors were more frequently observed in similar regional studies (1).

Unlike adolescents who are more vulnerable to attempted self-harm following break up of romantic relationships and puberty related risk taking behaviour, young children resort to committing self- harm when they feel the care takers are neglecting them (19, 20). They will communicate their cry of pain or cry of help by attempting self-poisoning. In addition, inconsistent parenting styles and verbal abuse of children as revealed in this study can have deleterious effects on child behaviour and can act as a risk factor for poisoning.

Poison related factors also operate differently in intentional poisoning. The investigators never observed either kerosene oil or a mosquito coil piece being ingested intentionally as it is well known to occur with unintentional poisoning (21). It was mostly an older child ingesting a pesticide or a plant seed with high toxic effects.

Risk factors for intentional poisoning were multitudinous in the current study. It is important that all child health care providers are well aware of these factors and every child with non-accidental poisoning needs to be taken very seriously. All children, especially those with non-accidental self-poisoning, need to be directed for formal psychiatric evaluation and the whole family may need continuous support and guidance from the community paediatrician over a long time.

The current study evaluated only the children who were hospitalised and it is a limiting factor of this study. The predisposing factors for non-accidental poisoning as revealed in this study, may be prevailing in many rural communities in Sri Lanka and the study may have revealed only the “the tip of the iceberg” phenomenon. The authors, in this background, propose community based studies for better revelation of risk factors for non-accidental poisoning in the paediatric age group.

CONCLUSION

Non-accidental poisoning in paediatric age could be either non-accidental self-poisoning or non-accidental poisoning by another person. Children with non-accidental self-poisoning often have acute psychological distress and an immediate preceding event which results in the poisoning event. Verbal abuse by parents, poor family relationships, psychiatric disorders in children and emotional disturbances are often predisposing the poisoning event. When the perpetrator was one of the parents, those families had major disruptions in family relationships.

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