

Original Research Article

Prevalence of accidents and poisoning due to household hazardous materials in a rural area of Kancheepuram, Tamil Nadu

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ABSTRACT

Background: Over the last few decades hazardous materials have become a common household item in many rural areas of the developing world. Due to their easy availability, commercialization, accessibility and lack of awareness it has become a significant health problem globally. The objective of the study is to estimate the prevalence of household hazardous material accidents and poisoning and the factors associated with household hazardous accidents and poisoning among the rural population.

Methods: A cross sectional study was done among the households located in rural fields practice area tertiary care hospital, with the sample size of 244 households by probability proportion sampling method. House to house interview was conducted using a predesigned, pre-tested questionnaire and household hazardous accidents and poisoning was assessed.

Results: The overall prevalence of household hazardous accidents was 2.1% among the population. Among them 70% were less than 10 years of age followed by 10 to 20 years. The prevalence of household hazardous accident and poisoning was found to be positively associated with the factors like age <10 years, easy accessibility and storage in the open self.

Conclusions: Regular assessment for household hazardous accident and poisoning should be carried out at the community level to find the exact burden. Utilization of this information, especially by the stakeholders and policy makers in the regional health sectors, can avert the problematic health situation.

Keywords: Household hazardous materials, Poisoning, Prevalence, Risk factors

INTRODUCTION

Over the last few decades hazardous materials have become a common household item in many rural areas of the developing world. Due to their easy availability, commercialization, accessibility and lack of awareness it has become a significant health problem globally.¹

The prevalence and deaths due to poisoning in developing countries have been increasing steadily in recent years. It is now estimated that, death by poisoning,

especially with pesticides, accounts for 30% of all unintentional deaths globally.²

Poisoning is a significant problem in India. In India deaths due to poisoning has been increasing since last two decades. It is estimated that 73% of unnatural deaths are due to poisoning which includes both adult and children.³ The finding that approximately 80% of all poisoning cases had obtained the poisonous agent in the home or just outside the home highlights the importance of safe storage of poisonous substances in the homes.³

In adults Pesticides are the most common poisonous agents used.⁴ In children kerosene poisoning was the most common agent followed by Cleaners, Acids, and Medicines.⁵

Studies have also emphasized that accidents are due to the lack of awareness on usage, storage, dispose of these materials and prevention and awareness regarding hazardous materials in community level may have significant impact in reducing in the incidence and death due to the poisoning in the community.

Only few studies have been done on hospital and territory care level whereas very few community-based studies published on the kind of household hazardous products that are used, and no studies were done on distributions Hazardous materials at home and their accessibility in rural Indian study community.³

Hence the study was undertaken to estimate the prevalence of Accidents and poisoning due to accidents and poisoning due to (HAZMAT) household hazardous materials and the factors associated with (HAZMAT) household hazardous materials accidents and poisoning.

METHODS

This study was conducted in rural field practice area of tertiary care hospital in Kancheepuram district, about 54 kms away from Chennai. In the previous study prevalence of poisoning was 17%.⁶ From the above prevalence rate (17%) with precision of 5% and including non-response sample size of 244 was calculated. From the above calculated sample size participants were selected from Kancheepuram district (Mamandur, Vadapathy, Meiyur, S. Mambakkam, Siripinaiyur, Thiruvanthavur, Kodithandalam, Natrajapuram, Samathuvapuram respective villages) during 2016-17 by Probability Proportional to Size. From each village, households were selected by simple random sampling using a computer random number generator. Inclusion criteria: A responsible adult member in their households during the study period. Exclusion criteria are households residing less than one year and subjects who are not willing to participate in the study.

The purpose of the study was clearly explained to the participants and their family members. Missed out households were revisited repeatedly and included in the study. The participant’s informed consent was obtained. Detailed information regarding demographic (i.e. age, sex, total family member in the household), socioeconomic, household chemical products and their storage and usage were collected. A questionnaire was prepared based on the information while reviewing the literature related to this study. Detailed information regarding household hazardous materials storage and usage were obtained from the responsible adult available in the household and also surveyed their house to look for any other household hazardous products with their

permission. In case of persons who met with the household hazardous accident the details of the place, time and the outcome of the treatment were obtained and also medical records in the available households were also reviewed. Privacy of each participant was strictly considered taking the survey.

Descriptive statistics were reported as frequencies (percentage) for categorical variables. Chi-Square at 5% level of significance was used to find statistical significance. Data were statistically evaluated with IBM SPSS Statistics for Windows, Version 20.0., IBM Corp., Chicago, IL.

RESULTS

The distribution of household hazardous materials at home majority being kerosene 202 (82.7%), followed by toilet cleaner/bleach/acids 143 (59.1%), ant killer 125 (51.3), sharp knives 113 (46.3%), drugs 58 (23.7%), rat killer 54 (21.3%), paints/ thinner 43 (17.6%), pesticides 26 (10.5%) and others being 21 (8.6). 58.8% of materials are stored in the open shelf followed by 20.1% on the floor, 12.8% in closed cupboard, and 8.4% outside the home (Table 1).

Table 1: Distribution of proportion of household hazardous material accidents and poisoning at households.

S. no	Hazardous material at home	Yes (%)	No (%)	Total (%)
1	Toilet cleaner/bleach/acids	3 (2.1)	140 (97.9)	143
2	Pesticides	1 (3.4)	25 (96.5)	26
3	Rat killer	1 (1.8)	51 (98.1)	52
4	Ant killer	1 (0.8)	124 (99.2)	125
5	Kerosene	8 (3.9)	194 (96.1)	202
6	Drugs	3 (5.1)	55 (94.8)	58
7	Paints/ thinner	1 (2.3)	42 (97.6)	43
8	Sharp knife	2 (1.7)	111(98.2)	113

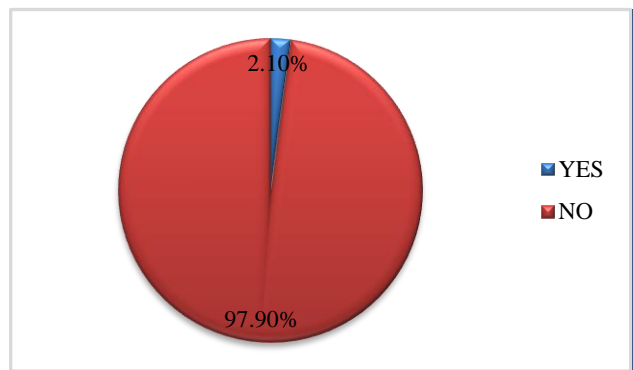


Figure 1: Prevalence of accident and poisoning among the study subjects due to household hazardous materials in last one year (n=941).

The distribution of household hazardous material at home which 63 households (26%) has easy accessibility for household hazardous materials and 181 households (74%) are not easily accessible for the household hazardous materials. Prevalence of accidental poisoning among the study population were due to household hazardous material in last one year which is in 2.1% and 97.9% has no accidents in last one year (Figure 1).

The proportion of accidents and poisoning due to household hazardous materials at home in last one year in which major being kerosene 8 (3.9%), followed by drugs (5.1%), toilet cleaner/bleach/acids 3 (2.1%), sharp knives 2 (1.7%), pesticides 1 (3.4%), rat killer 1 (1.8%), paints/thinner 1 (2.3%) and ant killer 1 (0.8%).

Table 2: Association between study variables and household hazardous materials and poisoning (n=244).

Variables	Hazmat accident and poisoning		OR	95% confidence interval	P value
	Present (n=20)	Absent (n=224)			
Type of family					
Nuclear family	17	207	2.14	0.57- 8.07	0.217
Joint family	3	17			
Socio economic class					
Upper	14	180	0.57	0.20 - 1.56	0.276
Lower	6	44			
Accessibility of HAZMAT					
Accessible	13	50	6.46	2.44 –17.06	<0.001
Not accessible	7	174			
Place of storage of HAZMAT					
Inside the house	15	165	0.93	0.94 – 1.08	0.56
Outside the house	5	59			
Reading product label					
No	14	151	0.88	0.97 – 1.71	0.514
Yes	6	73			

The distribution of place of storage of household hazardous materials at the time of accident in which major being materials stored on the floor 9 (45%), followed by outside the house 3 (15%), open shelf 7 (35%) and closed cupboard 1 (5%). Age of the subjects with household hazardous accidents which majority of them being below 10 years 14 (70%), followed by 11 to 19 years being 3 (15%) and above 20 years 3 (15%). Place of occurrence correspondents to household hazardous accidents and poisoning in which majority being at the home 15 (75%) followed by around (outside) the home 5 (25%).

The Table 2 shows the association between the study variables and household hazardous accident poisoning. Nuclear family was found to have 2.14 (95% CI 0.57 – 8.07) times higher risk than joint family of HAZMAT which was not statistically significant. There was statistically significant association (p<0.001) between accessibility and household hazardous material with 6.46 times of higher risk than not accessible to household hazardous material.

DISCUSSION

The prevalence of household hazardous accident and poisoning in rural population were 2.1%. Similar findings was seen in previous study conducted by Kumar accidental poisoning Southwest Maharashtra in which the

accidental poisoning is 1.8% and also a study done by Gupta et al on trends in poisoning in children at large referral hospitals shows that childhood poisoning was 2.1%.^{7,8} The study shows that majority of the household hazardous accident and poisoning cases has occurred among less than 10 years age group with 14 subjects which constitutes 70% of total household hazardous accidents and poisoning in the study followed by 10 to 19 years age group and more than 20 years age group.

The study shows the association between the age and the household hazardous material Accidents and poisoning, it was found to be statistically significant (p<0.05) with OR 11.11 times greater risk for household hazardous material accident and poisoning for below 20 years. Similar findings are shown in study done by Dutta et al shows study accidental poisoning was most common among children less than 5 years of age which constitutes 50% to 90% of all cases.⁹ Study done in Maharashtra by Kumar on accidental poisoning shows average age on the children was around 6.5 years.⁷ Study done by Parekh et al on kerosene poisoning estimates that cases reported due to kerosene poisoning was all under 3 years of age group.¹⁰

The present study shows poisoning due to kerosene was the major agent which accounts about 3.9%, similar findings have reported in study done in Maharashtra by Kumar on accidental poisoning shows kerosene

poisoning is the most common poisoning which accounts about 30%.⁷

In this study shows household hazardous materials at home majority being kerosene 82.7% followed by toilet cleaner/bleach/acids, ant killer, sharp knives, drugs, rat killer, paints/ thinner and pesticides among household in the study population. Whereas there are no studies in India have established the distribution of hazardous materials at home since studies are done in hospital setup and community based studies were not done to establish the distribution of household hazardous materials at home. Study done by Sawalha on Storage and utilization patterns of cleaning products in the home shows chlorine bleach and cleaning acids were the most common agents found at home.¹¹

The present study shows that 59.6% of hazardous materials are stored in the open shelf followed by 20.2% are on the floor, 11.8% in the closed cupboard, 4.6% are outside the house. Study also estimates the place of storage at the time of the accident which constitutes 5.1% of accidents occurred when the material stored on the floor, 4.6% occurred outside the house, 1.5% in open shelf, 1.1% occurred when stored in closed cupboard. It shows association between the accessibility of household hazardous material accidents and poisoning among the subjects in which shows statistically significant association ($p < 0.05$) between accessibility and household hazardous material with 6.46 times of higher risk than not accessible to household hazardous material.

In this study shows that majority of the household hazardous materials are stored in the open shelf which are easily accessed by the children and others. Study done by Sawalha on Storage and utilization patterns of cleaning products in the home shows most of those storage places were suboptimal and were within the reach of children.¹¹ In India studies done by Chowdhary et al in Kolkata and Singh et al on study of poisoning trends in North India. In relation to World have emphasized that majority of the poisoning reported are due to the easy accessibility and easy availability of the products, unregistered pesticides shop and sale of products in the community.^{4,6}

In this study shows among total household accidents and poisoning 75% have occurred inside the home followed by 25% accidents occurred outside the home. Similar findings shown in study done by Bose et al during 2009 in Vellore Tamil Nadu were 80% of self-poisoning has taken place in and around the home premises.³ Study done by Soori in Iran shows 89% of poisoning reported in the study was occurred inside the home.¹²

CONCLUSION

Regular assessment for household hazardous accident and poisoning should be carried out at the community level to find the exact burden. Knowledge and awareness about the household hazardous materials should be impaired

through appropriate information, education and communication (IEC) or behavior change communication activities about usage, storage and disposal of household hazardous materials. Utilization of this information, especially by the stakeholders and policy makers in the regional health sectors, can avert the problematic health situation.

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