Original Article

ESTIMATION OF AGE FROM ASSESSMENT OF ROOT TRANSLUCENCY IN MAXILLARY FIRST PREMOLAR TEETH.
Dr VT Jadhao, Dr. CV Tingne, Dr. AA Taware, Dr. HS Tatiya, Dr. SB Punpale

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ESTIMATION OF AGE FROM ASSESSMENT OF ROOT TRANSLUCENCY IN MAXILLARY FIRST PREMOLAR TEETH.

Dr VT Jadhao, Dr. CV Tingne, Dr. AA Taware, Dr. HS Tatiya, Dr. SB Punpale

Abstract

Age determination plays an important role in Forensic Medicine. Teeth are the most durable structures in human body even resistant to decomposition changes. Age determination from six retrogressive changes of teeth was suggested by Gustafson G. This study was designed to estimate the age by evaluating root translucency score and to decide whether the results were affected by the sex and the type of the diet of the person. Linear regressive analysis showed that estimation of age by assessing the root translucency score was statistically significant and showed a high regression co-efficient ($r^2 = 0.7038$). The regression line thus obtained can be used to estimate age of unknown cadaver by first calculating the root translucency score and then finding the age using regression line.

Introduction

Age determination plays an important role in Forensic Medicine, not only in identification and building profile of unknown bodies, but also in connection with crimes and accidents, particularly in mass disasters.[1, 2] Teeth are the most durable structures in human body. When the post mortem changes are extensive as in cases of advanced decomposed, charred, mutilated bodies and in cases where only few of the skeletal remains of the body are left; the teeth are often the only means of identification.[1,3] Owing to variable physical changes and already fused long bones after 25 years of age, the most common stomatological criteria for estimation of age in adults involve changes in hard tissues of teeth.[4,5] Gustafson G in 1950 suggested the use of six retrogressive changes and ranked them on arbitrary scale, allotting 0-3 points according to degree of changes. This method provides important and fairly constant evidence for estimation of age.[3,5] Among these parameters, root translucency is the sole significant parameter for dental age estimation as root translucency is considered to be less inclined to deviate in pathologic processes and resists environmental changes and other age-related changes.[6] Root develops uniformly from the infancy to adolescence. After adolescence, the root undergoes physiological changes such as translucency that gradually increases as age advances.[7] Thus; these changes can help possibly us to estimate age.

Material and method

The present study was conducted at Department of Forensic Medicine and Toxicology, Indira Gandhi Government Medical College, Nagpur, India from November 2008 to November 2010. Institutional ethics committee approval was obtained. Freshly extracted maxillary first premolar teeth of either side were obtained from the dead bodies brought for medicolegal autopsy. The study group comprised of 80 individuals from age group 26–70 years. Details regarding age, diet of the deceased were collected from the accompanying relatives.

The extracted teeth were preserved in freshly prepared 10% formalin solution to prevent dehydration. Each tooth was made into a 02 mm thickness section through its central axis by grinding on an electric lathe machine (Figure 1) under continuous water flow. Further grinding was done manually in one direction with a rough carborundum stone till the thickness of 01 mm was reached. The thickness was confirmed with a digital vernier caliper. At this thickness the root translucency (T) was measured using a graph paper. Scoring was

done according to Gustafson's criteria as follows: [3,8–10] T0 – no translucency, T1 – beginning of translucency, T2 – translucency is more than apical one-third of the root and T3 – translucency is more than apical two-third of the root (Figure 2).
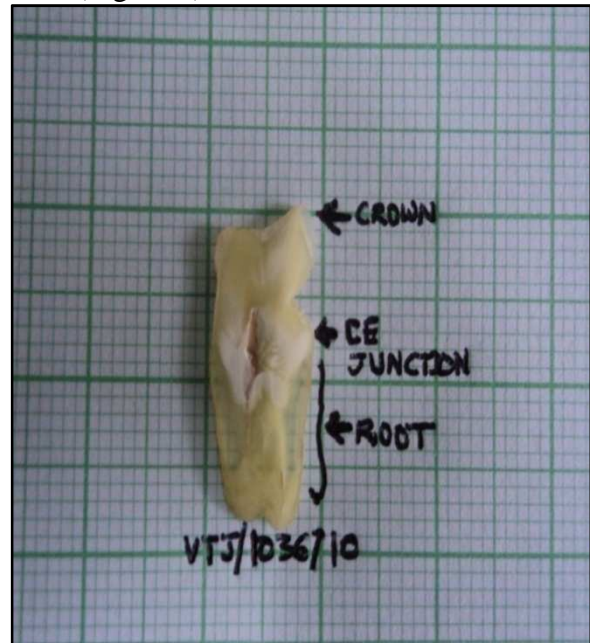

Figure 1: Electric lathe machine

Figure 2: Grade '3' Root Translucency

Observation and results

Maxilllay first premolars of either side were preferred over other teeth in this study as these are known to give best coefficient when compared with other teeth.[8] The study comprised of total 80 cases, of them 58 were males and 22 were females (Table 1). Maximum cases were from the age group 46-55 years (Table 2). As far as the type of diet of the study group was concerned it was observed that 47 were vegetarians while 33 consumed mixed diet (Table 3). The regression line (Figure 3) was obatined by plotting root translucency scrore (Table 4) against against the actual age of the individual and a regression formula was derived as $y=13.19x+25.07$, where 'y' was estimated age of the individual in years and 'x' was the root translucency score. The results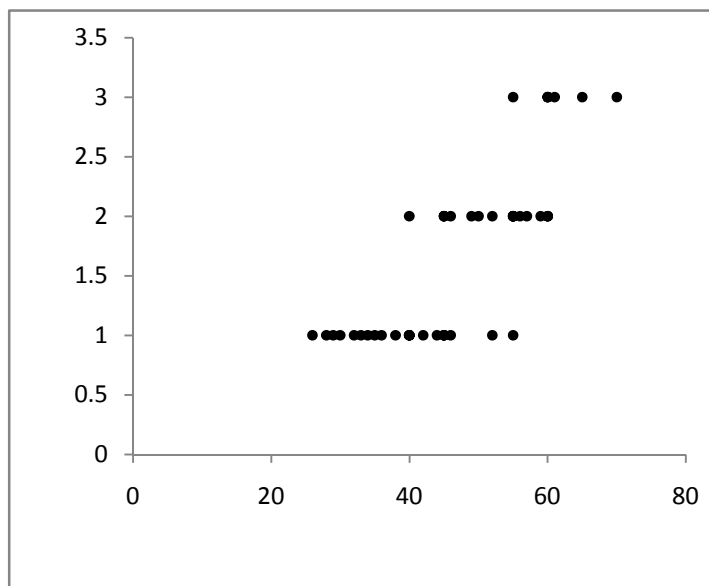 were statistically analysed. The mean root translucency score (Table 5) in males (1.58±0.72) was slightly lower than that in females (1.77±0.75), but statistically this difference was not significant (p=0.8772). Also mean root translucency score (Table 6) in vegetarians (1.659±0.7002) was slightly higher than that in those consuming mixed diet (1.606±0.7881), but statistically this difference was not significant (p=0.7101). The age of the person was calculated using the regression equation derived from root translucency score. It was found that the difference (Table 7)

Figure 3: Correlation between root translucency score and Actual age (On Y axis – Root translucency score; On X axis - Actual age in years)

between mean actual age (46.67±11.53) and the mean calculated age (46.67±9.67) was statistically not significant (p=0.6195). It was further found that there was a strong correlation between the actual age of the individual and the root translucency score (r^2=0.7038). Higher r^2 value indicates that root translucency has shown less deviation and is a significant factor that is helpful in estimation of age.

Sex	No. of cases
Male	58 (72%)
Female	22 (28%)
Total	80

Table 1: Sex wise distribution of cases

Group	Age Group (in year)	No. of Cases
I	26-35	19
II	36-45	20
III	46-55	24
IV	56-65	14
V	66 and above	3
	Total	80

Table 2: Distribution of cases in various age groups

Type of diet	No. of Cases
Vegetarian	47 (59%)
Mixed	33 (41%)

Table 3: Distribution of cases according to diet

Discussion

Determination of age in adults is a difficult task. Owing to variable physical changes and already fused long bones after 25 years of age, the most common stomatological criteria for estimation of age in adults involve changes in hard tissues of teeth. The present study was conducted to study the correlation between the age of the person and root translucency of teeth. Our observation that the mean root translucency score being slightly lower in males (1.58±0.72) than that in females (1.77±0.75), but statistically this difference was not significant (p=0.8772). Also statistically no significant difference was noted between the mean translucency score of vegetarians as compared with those consuming mixed diet. The present study shows a strong correlation between actual age of the individual and the root translucency score which is concurrent with the preexisting literature. [6,7,11] The correlation coefficients obtained in the present study for root translucency (r=0.8389) was found to be more significant as compared to correlation coefficient for root translucency obtained in the study of Monzavi BF et al[12] where the correlation coefficients for root translucency 0.344. The correlation coefficient for root translucency in the present study (r=0.8389) was similar to that of obtained in the study of Solheim T (1989)[6] which was 0.68 to 0.86. The regression line thus obtained can be used to estimate age of unknown cadaver by first calculating the root translucency score and then finding the age using regression line.

Table 5: Comparison of root translucency score according to sex of the person

Sex	No. of Cases	Mean	S.D.	Test	P	S
Male	58	1.58	0.72	0.1563	p = 0.8772	Not Significant
Female	22	1.77	0.75			

Table 6: Comparison of root translucency score according to diet of the person

Diet	No. of Cases	Mean	S.D.	Test	P	S
Vegetarian	47	1.659	0.7002	t = 0.375113	p = 0.7101	Not Significant
Mixed	33	1.606	0.7881			

Table 7: Comparison of Actual Age and Age estimated by using a newly derived regression equation from the root translucency score

Age	Range	Mean ±S.D.	T	p	S
Actual	26-70	46.67±11.53	t= 0.4984	p=0.6195	Non Significant
Calculated	38.26-64.64	46.67±9.67			

Table 4: Estimated age calculated using regression equation derived by score of root translucency factor alone (formula: y=13.19x+25.07), where 'x' is score of root translucency.

Case No.	Actual Age	Root Translucency Score	Estimated Age	Difference	Case No.	Actual Age	Root Translucency Score	Estimated Age	Difference
1	50	2	51.45	-1.45	41	35	1	38.26	-3.26
2	35	1	38.26	-3.26	42	59	2	51.45	7.55
3	55	2	51.45	3.55	43	40	1	38.26	1.74
4	34	1	38.26	-4.26	44	46	1	38.26	7.74
5	55	2	51.45	3.55	45	45	1	38.26	6.74
6	55	2	51.45	3.55	46	52	1	38.26	13.74
7	50	2	51.45	-1.45	47	38	1	38.26	-0.26
8	55	3	64.64	-9.64	48	45	1	38.26	6.74
9	32	1	38.26	-6.26	49	45	2	51.45	-6.45
10	55	3	64.64	-9.64	50	61	3	64.64	-3.64
11	55	2	51.45	3.55	51	40	1	38.26	1.74
12	65	3	64.64	0.36	52	40	1	38.26	1.74
13	45	2	51.45	-6.45	53	40	2	51.45	-11.45
14	70	3	64.64	5.36	54	32	1	38.26	-6.26
15	60	3	64.64	-4.64	55	60	3	64.64	-4.64
16	50	2	51.45	-1.45	56	36	1	38.26	-2.26
17	26	1	38.26	-12.26	57	30	1	38.26	-8.26
18	30	1	38.26	-8.26	58	44	1	38.26	5.74
19	32	1	38.26	-6.26	59	35	1	38.26	-3.26
20	28	1	38.26	-10.26	60	40	1	38.26	1.74
21	46	2	51.45	-5.45	61	49	2	51.45	-2.45
22	33	1	38.26	-5.26	62	40	1	38.26	1.74
23	52	2	51.45	0.55	63	56	2	51.45	4.55
24	70	3	64.64	5.36	64	57	2	51.45	5.55
25	60	2	51.45	8.55	65	46	1	38.26	7.74
26	40	1	38.26	1.74	66	35	1	38.26	-3.26
27	55	1	38.26	16.74	67	50	2	51.45	-1.45
28	55	1	38.26	16.74	68	35	1	38.26	-3.26
29	55	2	51.45	3.55	69	45	1	38.26	6.74
30	40	1	38.26	1.74	70	60	2	51.45	8.55
31	65	3	64.64	0.36	71	28	1	38.26	-10.26
32	65	3	64.64	0.36	72	38	1	38.26	-0.26
33	50	2	51.45	-1.45	73	29	1	38.26	-9.26
34	50	2	51.45	-1.45	74	55	2	51.45	3.55
35	42	1	38.26	3.74	75	50	2	51.45	-1.45
36	55	2	51.45	3.55	76	45	1	38.26	6.74
37	70	3	64.64	5.36	77	28	1	38.26	-10.26
38	56	2	51.45	4.55	78	59	2	51.45	7.55
39	32	1	38.26	-6.26	79	33	1	38.26	-5.26
40	65	3	64.64	0.36	80	40	1	38.26	1.74

Conclusion

Translucency noted in the apical root portion can be used for age estimation. Statistical analysis showed that the root translucency score is reliable and helpful in determining age of an unknown cadaver from the regression equation hence obtained. The root translucency score used in age estimation of the person had no significant correlation with gender and the type of diet of the person. Furthermore, longitudinal studies are required with large sample sizes in different populations to conclude anything positively.

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Original Article

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Original Article

STUDY OF AUTOPSY FINDINGS INCASES OF ACUTE POISONING

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Dr. KD Chavan, Dr. RS Bangal

Abstract

This hospital based prospective cross sectional study was carried out over a period of two years duration from 01/09/2008 to 31/08/2010 in the Rural Medical College and Pravara Rural Hospital, of Pravara Institute of Medical Sciences, Loni, Taluka Rahata, Ahmednagar (M.S) India to study characteristic external and internal postmortem examination findings of acute poisoning cases. All cases of acute poisoning brought for postmortem examination which was either brought dead or died during treatment with history of acute poisoning or known and unknown bites and stings were included in the study. Comprehensive proforma for the study was designed which containing the external and internal findings of postmortem examination.

During the study period, total 62 fatal cases of acute poisoning were recorded. Froth or secretion at mouth and nostrils was the predominant external autopsy finding which was followed by characteristic odor from mouth. Most common internal autopsy finding was inflammation and congestion, petechial hemorrhages of mucosa of the stomach. Congestion of organs, cerebral and pulmonary edema were the common internal autopsy finding in poisoning cases.Stomach contents revealed kerosene like odor in maximum number of cases followed by garlicky odor and acetone like odor.

Keywords : Postmortem findings, Autopsy findings, Acute poisoning, Snake bite & sting.

Introduction:

Poisons have been the subject of curiosity since ancient times. Their systematic study is traced to the 16th century. Traditionally, arsenic has been the favorite for homicide and opium for suicide, though there has been an increasing incidence of use of organophosphorus insecticides for suicide. In India, due to the relative ease with which poisons are available, naturally or in the market, cases of human poisoning are commoner than they are in the West.[1]Frequently reported mortality of snake bite in India alone is over 15,000 per annum[2]and rising rates of snakebite deaths have been reported by WHOin India and Sri Lanka, where large jungles were torn down to make new hydroelectric projects or the highways.[3]

Variousexternal and internal post mortem findings are likely to be the key determinants to identify acute poisoning cases and to rule out cause of death, hence it is of critical importance that these factors be firmly established.Hence the present study is undertaken with the aim to study characteristic external and internal postmortem examination findings of acute poisoning cases which is necessary for the purpose of identification of poisoning as a cause of death. The recognition of poisoning is a matter of first importance from the point of view of the medical jurist whose duty is to help in unmasking the culprit. So acute poisoning is of special interest to the medical jurist.

The results of this study will help the medical officers to know the common external and internal postmortem findings to look for in cases of acute poisoning which in turn will help the judiciary for proper disbursement of justice.

Materials and methods:

This hospital based prospective cross sectional study was approved by Institutional Ethics and Research committee of Pravara Institute of Medical Sciences (PIMS), Loni and carried out over a period of two years duration from 01/09/2008 to 31/08/2010 in the Rural Medical College and Pravara Rural Hospital, of Pravara Institute of Medical Sciences, Loni, TalukaRahata, Ahmednagar (M.S) India, which is a tertiary care teaching hospital chiefly catering to the demands of rural area of Ahmednagar& adjacent districts of Maharashtra.

All cases of acute poisoning brought for postmortem examination which were either brought dead ordied during treatmentwith history of acute poisoning or known and unknown bites and stings were included in the study. All cases of chronic poisoning, brought dead cases without history of acute poisoning and bites and stings were excluded from the study.

Comprehensive proforma for the study was designed which containedthe external and internal findings of postmortem examination. External findings which were included are the presence of odor from mouth, froth or secretions at mouth and nostrils, stains around lips and nostrils, cyanosis, soiling of clothes with vomitus, subconjunctival hemorrhage, bite/sting mark, signs of inflammation at the site of bite/sting mark and corrosions around oral cavity. The internal examination included examination of the gastrointestinal tract and other organs.

Relevant data of the individual poisoning cases was collected from medico legal cases register of casualty, case papers from concerned department, inquest, post-mortem reports, chemical analysis report after taking informed consent from patient or relatives. Then the data was registered in a master chart. Data was statistically analyzed using statistical software SPSS Statistic 17 and Microsoft Office Excel 2003. Data was analyzed in the form of percentage (%) and proportion. Observations were presented in the tabular form.

Observations and Results:

During the study period, total 62 fatal cases of acute poisoning were recorded.

Table No. 1: Distribution of external postmortem findings in fatal cases of acute poisoning. (n=62, Multiple response)

External Postmortem Findings	No.	%
Characteristic odor from mouth	28	45.16
Froth or secretions at mouth and nostrils	37	59.68
Stains around lips and nostrils	22	35.48
Cyanosis	19	30.65
Soiling of clothes with vomitus	13	20.97
Subconjunctival Hemorrhage	01	01.61
Bite/Sting mark	06	09.68
Signs of inflammation at the site of bite/sting mark	06	09.68
Corrosion around oral cavity	01	01.61

Table No.1 reveals that out of 62 fatal cases of poisoning froth and secretion at mouth and nostrils was the predominant external autopsy finding in 37 (59.68%) cases which was followed by characteristic odor from mouth in 28 (45.16%) cases. Stains around lips and nostrils were found in 22 (35.48%) cases, cyanosis in 19 (30.65%) cases, soiling of clothes by vomitus in 13 (20.97%) cases. Subconjunctival hemorrhage and corrosion around oral cavity

was seen in 1 (01.61%) case each. Bite/sting marks and signs of inflammation at the site of bite/sting marks were found in 06 (09.08%) cases.

Table No. 2: Distribution of internal postmortem findings in fatal cases of acute poisoning. (n=62, Multiple response)

Organs	Corrosion		Petechial hemorrhage		Inflammation and Congestion		Softening		Ulceration		Perforation	
	No	%	No	%	No	%	No	%	No	%	No	%
Esophagus	1	1.61	4	6.45	56	90.32	1	1.61	01	1.61	1	1.61
Stomach	1	1.61	26	41.94	60	96.77	1	1.61	03	4.84	1	1.61
Small intestine	1	1.61	7	11.29	43	69.35	0	0.00	01	1.61	1	1.61
Large intestine	0	0.00	3	4.84	07	11.29	0	0.00	00	0.00	0	0.00

Table No.2 depicts that most common internal autopsy findings were inflammation and congestion of mucosa of the stomach [60 (96.77%)] followed by esophagus [56 (90.32%)], small intestine [43 (69.35%)] and large intestine [07 (11.29%)].

Least common autopsy findings were corrosion of mucosa of esophagus, stomach and small intestine, softening of mucosa of the esophagus and stomach, ulceration of mucosa of esophagus and small intestine and perforation of esophagus, stomach and small intestine which were found in only 1 (01.61%) case each.

Petechial hemorrhages were found on mucosa of the stomach in 26 (41.94%) cases followed by small intestine in 7 (11.29%) cases, esophagus in 4 (06.45%) cases and large intestine in 03 (04.84%) cases.Softening of mucosa was found only in the esophagus and stomach in 1 (01.61%) case each.Ulceration was found mostly in the mucosa of the stomach in 3 (04.84%) cases followed by esophagus and small intestinal mucosa in 1 (1.61%) case each.Perforation was found in esophagus, stomach and small intestine in 1 (01.61%) case each.

Table No. 3: Distribution of fatal cases of acute poisoning according to congestion of organs. (n=62, Multiple response)

Organs	Congestion	
	No.	%
Liver	59	95.16
Spleen	60	96.77
Kidneys	60	96.77
Lungs	58	93.55
Meninges & Brain	61	98.39

Table No. 4: Distribution of edema and petechial hemorrhage in lungs and brain in fatal cases of acute poisoning. (n=62, Multiple response)

Organs	Edema		Petechial hemorrhage	
	No.	%	No.	%
Lungs	47	75.81	8	12.90
Brain	61	98.39	13	20.97

Table No.3 reveals that the maximum cases were reported with congestion of meninges & brain [61 (98.39%)] followed by spleen and kidneys in 60 (96.77%) cases each. In 59 (95.16%) cases the liver and in 58 (93.55%) cases lungs showed congestion.

Table No.4 shows that edema of brain was reported in 61 (98.39%) cases and edema of lungs in 47 (75.81%) cases. Petechial hemorrhages were present in brain in 13 (20.97%) cases and in lungs in 08 (12.90%) cases.

Table No. 5: Distribution of odor from mouth and stomach with its contents in fatal cases of acute poisoning. (n=56)

Odor	Mouth		Stomach with its contents	
	No.	%	No.	%
Kerosene like	26	46.43	47	83.93
Acetone like	02	03.57	02	03.57
Garlicky	00	00.00	04	07.14
Absent	28	50.00	03	05.36
Total	56	100	56	100

*Out of 62 fatal cases 6 cases of snake bite were excluded for this table.

Table No. 5 depicts that stomach and its contents revealed kerosene like odor in 47 (83.93%) cases, garlicky odor in 4 (07.14%) cases and acetone like odor in 2 (03.57%) cases. Odor from stomach and its contents was absent in 3 (05.36%) cases. Kerosene like odor perceived from mouth in 26 (46.43%) cases and acetone like odor in 2 (03.57%) cases. Odor from mouth was absent in 28 (50.00%) cases.

Discussion:

During the study period, total 557 cases of acute poisoning were recorded. Thereafter all the details of the findings of individual examination were noted and statistically analyzed. The results of the present study were compared and discussed with available literature of other similar studies in India and abroad.

Finding that froth or secretions at mouth and nostrils in 59.68% cases of the present study, as observed in Table No.1 were similar to study done by Job C[4] and Zariwala RC[5] (after calculation) who reported froth from the mouth in 63.28% cases and 35.94% cases respectively. PillayVV[6] reported characteristic odor from mouth and cyanosis to be a common external autopsy findings which were consistent with the present study. In spite of extensive search we could not find other comparable findings like stains around lips and nostrils, soiling of clothes by vomitus, subconjucnctival hemorrhage, corrosions around oral cavity in studies done by other authors. **(Table No.1)**

Findings of the present study i.e. inflammation and congestion of mucosa of the stomach in 96.77% cases and corrosions in 1.61% cases as observed in Table No.2 were comparable to study done by Job C[4] who reported most common finding to be gastric mucosal congestion in 76.33% cases and corrosion to be 05.59% cases. In spite of extensive search, we could not compare other findings like petechial hemorrhages, softening, ulceration and perforation of mucosa of esophagus, stomach, small and large intestine in the present study with other studies due to non availability of such findings in studies done by other authors.**(Table No.2)**

In spite of extensive search we could not compare findings in Table No.3 in the present study with other studies due to non availability of organ wise variation of congestion in studies done by other authors. PillayVV[6] reported congestion of organ to be common internal autopsy finding in poisoning cases which is comparable to our study. **(Table No.3)**

Finding of pulmonary edema in 75.81% cases as observed in Table No.4 in the present study was comparable to study done by Job C[4] who reported pulmonary edema to be in 90.16% of poisoning cases. PillayVV[6] reported cerebral and pulmonary edema to be common internal autopsy finding in poisoning cases which was observed in 98.39% and 75.81% cases respectively in our study. In spite of extensive search we could not compare findings of cerebral edema and organ wise variation of petechial hemorrhages in the present

study with other studies due to non availability of such findings in studies done by other authors. **(Table No.4)**

Our finding i.e. kerosene like odor from stomach and its contents in 83.93% cases of poisoning as observed in Table No.5 was in contrast with finding of the study done by Zariwala RC[5] who reported that kerosene like odor of stomach contents to be in 1.80% cases and this may be due to fact that that author classified another category of odor as insecticide which included 46.40% cases which were commonly of insecticide poisoning and usually contains solvent as petroleum derivative such as aromax which has kerosene like odor. Our study finding of acetone like odor in 3.57% cases was comparable with the study done by Job C[4] who reported it to be in 06.38% cases. In spite of extensive search we could not compare distribution of odor from mouth due to non availability of such finding in the studies done by other workers. **(Table No.5)**

Conclusion:

The study was conducted over the period of two years duration from 01/09/2008 to 31/08/2010. During the study period, total 62 fatal cases of acute poisoning were recorded.

1. Froth or secretion at mouth and nostrils was the predominant external autopsy finding which was followed by characteristic odor from mouth. Stains around lips and nostrils, cyanosis, soiling of clothes by vomitus, bite / sting mark and signs of inflammation at the site of bite/sting mark were common external autopsy findings in cases of poisoning.
2. Most common internal autopsy finding was inflammation and congestion, petechial hemorrhages of mucosa of the stomach. Other internal autopsy findings were corrosion of mucosa of esophagus, stomach and small intestine, softening of mucosa of the esophagus and stomach, ulceration of mucosa of esophagus and small intestine and perforation of esophagus, stomach and small intestine.
3. Congestion of organs was common internal autopsy finding in poisoning cases.
4. Cerebral and pulmonary edema were the common internal autopsy finding in poisoning cases.
5. Stomach contents revealed kerosene like odor in maximum number of cases followed by garlicky odor and acetone like odor.

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Original Article

STUDY OF OUTCOME IN ACUTE POISONING CASES IN RURAL REGION OF WESTERN MAHARASHTRA
Dr. SB Datir, Dr. M Petkar, Dr. JM Farooqui, Dr. CS Makhani, Dr. SN. Hussaini,
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Original Article

STUDY OF OUTCOME IN ACUTE POISONING CASES IN RURAL REGION OF WESTERN MAHARASHTRA

Dr. SB Datir, Dr. M Petkar, Dr. JM Farooqui, Dr. CS Makhani, Dr. SN. Hussaini,
Dr. KD Chavan, Dr. RS Bangal

Abstract

This hospital based prospective cross sectional study was carried out over a period of two years duration from 01/09/2008 to 31/08/2010 in the Rural Medical College and Pravara Rural Hospital, of Pravara Institute of Medical Sciences, Loni, Taluka Rahata, Ahmednagar (M.S) India to study outcome according to category and type of poison in acute poisoning cases. All admitted and brought dead cases of acute poisoning, cases of known and unknown bites and stings from all age were included in the study. Total 557 cases of acute poisoning were recorded out of which 62 (11.13%) cases were fatal. There was 100% recovery each in household poisons, pharmaceutical drugs, plant poisons followed by animal bites and stings (96.86%). The recovery in cases of agrochemicals poisoning was 88.26%. Fatality in cases of ethyl alcohol poisoning was 66.66%, organochloine compounds 56.52%, combination of organophosphorus&pyrethroid 16.67%, corrosives 16.67%, snake bite (14.59%) [Vasculotoxic snake bite and Neurotoxic snake bite cases were 08.33 % and 06.26% respectively] and organophosphorus 13.21 %. The present study helps to interpret the outcome of poisoning in the rural area.

Keywords : Outcome of poisoning,Acute poisoning, Snake bite & sting.

Introduction:

According to World Health Organization (WHO) reports, about 3 million people around the world consume poison every year, out of them 2,20,000 deaths occur annually. About 99% of these deaths occur in the developing countries. Highest numbers of poisoning cases are in Sri Lanka. Unfortunately India is not lagging much.[1] The incidence of poisoning is rising in India. More than 50,000 individuals die of poisoning every year.[2] As per the Registrar General of India, more than one lakh persons (1,22,637) in the country lost their lives by committing suicide during the year 2007 and the commonest means adopted for suicide was poisoning in 34.8% cases.[3] Insecticides and pesticides compounds have created many serious problems, because most suicides in the recent years have been traced to their oral intake as they have been preferred because of their rapid action and knowledge of lethal potency.[4, 5-8] In India, due to the relative ease with which poisons are available, cases of human poisoning are commoner than they are in the West.[4] Snake bites has become a rural and occupational hazards worldwide. Though it is neglected, but is a significant cause of morbidity and mortality in tropical and subtropical countries.[9] Frequently reported mortality of snake bite in India alone is over 15,000 per annum[10] and 40,000 to 60,000 per annum worldwide (2.35%).[9,11]

The availability of various poisons and the prescribing pattern of drugs are likely to be the key determinants for the outcome of poisoning, hence it is of critical importance that these factors be firmly established which in turn will help to decide policies to reduce the morbidity and mortality due to acute poisoning. So the present study is undertaken to study outcome according to category and type of poison in acute poisoning cases.

Materials and Methods:

This hospital based prospective cross sectional study was approved by Institutional Ethics and Research committee of Pravara Institute of Medical Sciences (PIMS), Loni and

carried out over a period of two years duration from 01/09/2008 to 31/08/2010 in the Rural Medical College and Pravara Rural Hospital, of Pravara Institute of Medical Sciences, Loni, TalukaRahata, Ahmednagar (M.S) India, which is a tertiary care teaching hospital chiefly catering to the demands of rural area of Ahmednagar& adjacent districts of Maharashtra.

All admitted and brought dead cases of acute poisoning, cases of known and unknown bites and stings from all age were included in the study. All cases of chronic poisoning, poisoning cases admitted and referred to other hospitals, absconded cases, brought dead cases without history ofacute poisoning, cases admitted without history of poisoning, bites and stings were excluded from the study.

Comprehensive proforma for the study was designed which contains category and type of poison along with outcome of acute poisoning cases. Relevant data of the individual poisoning cases was collected from medico legal cases register of casualty, case papers from concerned department, inquest, post-mortem reports, chemical analysis report after taking informed consent from patient or relatives. Then the data was registered in a master chart. Data was statistically analyzed using statistical software SPSS Statistic 17 and Microsoft Office Excel 2003. Data was analyzed in the form of percentage (%) and proportion. Chi square test was used as test of significance. If p value was < 0.05 then the difference in variables was said to be statistically significant and if it was more, then difference in variables was said to be statistically not significant. Observations were presented in the tabular form.

Results:

During the period of 24 months from September 2008 to August 2010 total 557 cases of acute poisoning were reported out of which 15 (2.70%) cases were brought dead.

Table No. 1: Distribution of acute poisoning cases according to outcome.

Recovered		Death						Total	
		Brought dead		Died during treatment		Total deaths			
No.	%	No.	%	No.	%	No.	%	No.	%
495	88.87	15	02.70	47	08.43	62	11.13	557	100

The table No. 1 depicts that out of 557 cases of poisoning majority of cases [495 (88.87%)] were recovered and discharged, 15 (02.70%) cases were brought dead and 47 (08.43%) cases died during treatment. Total fatality due to poisoning was found to be in 62 (11.13%) cases.

Table No. 2: Outcome in acute poisoning cases according to category of poison.

Category of poison	Recovered		Death						Total	
			Brought dead		Died during T/t		Total deaths			
	No.	%	No.	%	No.	%	No.	%	No.	%
Agrochemicals	218	88.26	08	3.24	21	8.50	29	11.74	247	100
Industrial chem.	01	50.00	00	0.00	01	50.0	01	50.00	02	100
Household poison	28	100.0	00	0.00	00	0.00	00	00.00	28	100
Pharmaceuticals	14	100.0	00	0.00	00	0.00	00	00.00	14	100
Animal bite/ sting	185	96.86	01	00.52	05	02.62	06	03.14	191	100
Plant poisons	10	100.00	00	00.00	00	00.00	00	00.00	10	100
Miscellaneous	04	66.67	01	16.67	01	16.67	02	33.34	06	100
Unknown	35	83.33	03	07.14	04	09.53	07	16.67	42	100
Pending	00	00.00	02	11.76	15	88.24	17	100.0	17	100

χ^2 = 28.494632, P = 0.0002, Significant

Table No.2 revealed 100% recovery in poisoning due to household poisons, pharmaceutical products and plant poisons. In animal bites and stings recovery was 96.86% and in agrochemicals it was 88.26%. This difference in the recovery rates was statistically significant.

Table No. 3: Outcome in acute poisoning cases according to type of poison.

SN	Type of poison	Recovered		Death						Total	
				Brought dead		Died during treatment		Total deaths			
		No.	%	No.	%	No.	%	No.	%	No.	%
1	Organophosphorus	92	86.79	02	1.89	12	11.32	14	13.21	106	100
2	Organochlorine	10	43.48	06	26.09	07	30.43	13	56.52	23	100
3	Pyrethroid	22	100.0	00	00.00	00	00.00	00	00.00	22	100
4	Organophosphorus and Pyrethroid	10	83.33	00	00.00	02	16.67	02	16.67	12	100
5	Formamidine pesticide- Amitraz	81	100.0	00	00.00	00	00.00	00	00.00	81	100
6	Zinc phosphide	02	100.0	00	00.00	00	00.00	00	00.00	02	100
7	Corrosives	05	83.33	00	00.00	01	16.67	01	16.67	06	100
8	Kerosene	24	100.0	00	00.00	00	00.00	00	00.00	24	100
9	Sedative tablets	04	100.0	00	00.00	00	00.00	00	00.00	04	100
10	Antiepileptic tablet	02	100.0	00	00.00	00	00.00	00	00.00	02	100
11	Haematinics	01	100.0	00	00.00	00	00.00	00	00.00	01	100
12	Antipsychotics	01	100.0	00	00.00	00	00.00	00	00.00	01	100
13	Analgesics and Antipyretics tablets	03	100.0	00	00.00	00	00.00	00	00.00	03	100
14	Muscle relaxants	01	100.0	00	00.00	00	00.00	00	00.00	01	100
15	Antihypertensives	01	100.0	00	00.00	00	00.00	00	00.00	01	100
16	Vasculotoxic snake	44	91.67	00	00.00	04	8.33	04	08.33	48	100
17	Neurotoxic snake	30	93.74	01	3.13	01	3.13	02	06.26	32	100
18	Nonpoisonus snake	55	100.0	00	00.00	00	00.00	00	00.00	55	100
19	Scorpion bite/sting	19	100.0	00	00.00	00	00.00	00	00.00	19	100
20	Unknown bite	37	100.0	00	00.00	00	00.00	00	00.00	37	100
21	Castor seeds	06	100.0	00	00.00	00	00.00	00	00.00	06	100
22	Dhatura seeds	02	100.0	00	00.00	00	00.00	00	00.00	02	100
23	Ganja (Cannabis)	02	100.0	00	00.00	00	00.00	00	00.00	02	100
24	Unknown tablets	01	100.0	00	00.00	00	00.00	00	00.00	01	100
25	Carbamates	01	100.0	00	00.00	00	00.00	00	00.00	01	100
26	Ethyl alcohol	01	33.33	01	33.33	01	33.33	02	66.66	03	100
27	Food poisoning	03	100.0	00	00.00	00	00.00	00	00.00	03	100
28	Unknown	35	83.34	03	7.14	04	9.52	07	16.66	42	100
29	Pending	00	00.00	02	11.76	15	88.24	17	100.00	17	100

Table No.3 revealed 100% recovery in pyrethroid, formamidine pesticide- amitraz, zinc phosphide, kerosene, sedative tablets, antiepileptic tablets, haematinics, antipsychotic tablets, analgesics and antipyretics, tablets, muscle relaxant tablets, antihypertensive tablets, non poisonous snake bite, scorpion bite (sting), unknown bite, castor seeds, dhatura seeds, ganja (cannabis), unknown tablets, carbamates and food poisoning .

Fatality of 66.66% was seen in cases of ethyl alcohol, 56.52% in cases of organochlorine compounds and 16.67% each in cases of corrosives and poisoning due to combination of organophosphorus&pyrethoid.

Fatality of 13.21% was seen in cases of organophosphorus and 14.59% in cases of snake bite [Vasculotoxic snake bite (08.33%) and Neurotoxic snake bite (06.26%)].

In 16.66% of deaths the poison remained unknown and results of analysis of viscera is still pending in 17 deaths.

Discussion:

The results of the present study were compared and discussed with available literature of other similar studies in India and abroad. During the study period, total 557 cases of acute poisoning were recorded.

As per Table No.1 fatality found in the present study was 11.13% which was less as compared to fatality stated by Bhatkule PR[12]and Sinha US et al[13]who reported it to be 14.9% and 33.69% respectively. This may be due to fact that this Pravara Rural Hospital, Loni is a tertiary care teaching hospital and is situated in a rural area itself and hence easy and faster approach to this nearer hospital and so the early treatment may have reduced fatality in the present study. **(Table no.1)**

As observed in Table No.2, maximum recovery seen in victims of household poisons, pharmaceutical products, plant poisons may be due to fact that these poisons were less toxic or may have been taken in smaller quantities. Higher recovery observed in victims of animal bites and stings categories of poison may be due to fact that the Pravara Rural Hospital is situated in the village in the rural area so victims of animal bites and stings may have got early treatment. Another reason may be due to the fact that we have included non poisonous snake bite cases also in the present study.

As seen in Table No.2, recovery in victims of agrochemicals and animal bite & stings categories of poison in the present study was 88.26% and 96.86% respectively. Similar findings were observed in study done by WananukulW[14] in Thailand who reported recovery with agrochemicals i.e. pesticides (90.00%) and animal bite and stings (94.10%). There was 100% recovery due to household poisons, pharmaceutical products and plant poisons in the present study but Wananukul W[14]reported it to be in 99.00%, 98.30% and 95.90% cases respectively.

Highest fatality in the category of the poisons whose results of analysis are still pending may be due to the fact that in fatal cases of poisoning we identified the final poison and its category only after the chemical analysis report (even though there is some specific history, clinical diagnosis) which is pending in 17 cases. The second highest fatalitypercentage found due to industrial chemicals may be due to fact that we found only two cases of strong corrosive poisoning of which one died and it may be because of its capacity to cause severe local damage as compared to other categories of poisons.

In the miscellaneous group which contains most of the cases due to ethyl alcohol poisoning, higher fatality may be due to fact that these cases were presented late because victims consumed alcohol in the night and when they did not wake up and respond to family members in the morning then only they were brought up to the hospitals leading to late treatment.

Higher fatality in unknown category of poisons may be due to fact that exact treatment or specific antidote might not have been given due to unknown status of poison.

Higher fatality in agrochemicals category of poisons may be attributed to fact that these poisons were taken with suicidal intentions and so the quantity consumed was more (fatal) as compared to poisons in other categories. **(Table No.2)**

Table No. 4: Comparison of outcome according to type of poison in acute poisoning cases with other studies.

Sr.No	Type of poison	Fatality %				
		Present study	Chaudhary BL et al[1]	Sinha US et al[13]	KD Chavan et al[15]	Tauarani NG et al[16]
1	Organophosphorus	13.21	27.9	32.65	15.12	14.08
2	Organochlorine	56.52	21.6	11.11	16.12	00.00
3	Pyrethroid	00.00	-	-	-	00.00
4	Organophosphorus and Pyrethroid	16.67	-	-	-	00.00
5	Formamidine pesticide-Amitraz	00.00	-	-	-	00.00
6	Zinc phosphide	00.00	33.35	38.10	-	00.00
7	Corrosives	16.67	-	16.67	00.00	12.90
8	Kerosene	00.00	-	-	-	00.00
9	Sedative tablets	00.00	-	-	00.00	00.00
10	Antiepileptic tablets	00.00	-	00.00	-	-
11	Haematinics	00.00	-	-	00.00	-
12	Antipsychotic tablets	00.00	-	-	00.00	-
13	Analgesics and Antipyretics tablets	00.00	-	-	00.00	-
14	Muscle relaxant tablets	00.00	-	-	-	--
15	Antihypertensive tablets	00.00	-	-	-	-
16	Vasculotoxic snake bite	08.33	05.60	-	-	-
17	Neurotoxic snake bite	06.26		-	-	-
18	Non poisonous snake bite	00.00		-	-	-
19	Scorpion bite (sting)	00.00	-	-	-	-
20	Unknown bite	00.00	-	-	-	-
21	Castor seeds	00.00	-	-	-	-
22	Dhatura seeds	00.00	-	20.00	-	-
23	Ganja (Cannabis)	00.00	-	-	-	-
24	Unknown tablets	00.00	-	-	-	-
25	Carbamates	00.00	-	-	-	-
26	Ethyl alcohol	66.66	28.57	25.00	-	-
27	Food poisoning	00.00	-	-	-	00.00
28	Unknown	16.66	23.80	05.13	40.00	00.00
29	Pending	100.00	-	-	-	-

As observed in Table No.3, maximum recovery was seen in victims of poisoning due to pyrethroids, formamidine pesticide- amitraz, zinc phosphide, kerosene, sedative tablets,

antiepileptic tablets, haematinics, antipsychotic tablets, analgesics and antipyretics tablets, muscle relaxant tablets, antihypertensive tablets, non poisonous snake bite, scorpion bite, unknown bite, castor seeds, dhatura seeds, ganja (cannabis), unknown tablets, carbamates and food poisoning. This may be due to fact that these poisons were less toxic or the victims might have been exposed to smaller quantities of poisonous substance.

Most of the above mentioned pharmaceutical drugs might not have been taken in the fatal quantities. In cases of non poisonous snake bite, scorpion bite (sting) or unknown bite the recovery was much higher because the snakes were non poisonous and in cases of scorpion and unknown bites the venom was mild in action or might have been injected in lesser quantities. Recovery was also higher in the cases of poisoning due to castor seeds, dhatura seeds, kerosene and food poisoning as these cases were accidental and exposure to these poisons may not be in the fatal quantities.

Higher fatality in the pending group of poisons may be due to fact that in fatal cases of poisoning we could know the exact poison only after the chemical analysis report (even though there is some specific history, clinical diagnosis) which is pending in 17 cases.

Fatalities in cases of ethyl alcohol poisoning may be due to the fact that these cases were presented late because victims consumed alcohol in the night and when they did not wake up and respond to family members in the morning then only they were brought up to the hospitals leading to late treatment.

Higher fatality found in cases of poisoning due to organochlorine compounds, combination of organophosphorus&pyrethroid compounds, and organophosphorus compounds may be due to fact that these poisons were taken with suicidal intentions and so the quantity consumed was more (fatal) and these poisons are more fatal as compared to other poisonous compounds.

The fatality in cases of corrosive poisoning may be because of its capacity to cause severe local damage as compared to other types of poisons.

Higher fatality in victims of unknown poisons may be due to the fact that exact treatment or specific antidote may not have been given due to unknown status of poison.

Higher fatality due to snake bites [Vasculotoxic snake bites and Neurotoxic snake bites] may be due to the fact that most of the cases may have occurred in the late evening or night time so shifting of victims to hospital might have been delayed leading to late treatment.**(Table No.3)**

Conclusions:
1. During the study period, total 557 cases of acute poisoning were recorded out of which 62 cases were fatal i.e. total fatality due to acute poisoning was found to be in 62 (11.13%) cases.
2. There was 100% recovery each in household poisons, pharmaceutical drugs, plant poisons followed by animal bites and stings (96.86%). The recovery in cases of agrochemicals poisoning was 88.26%.
3. Fatality in cases of ethyl alcohol poisoning was 66.66%, organochloine compounds 56.52%, combination of organophosphorus&pyrethroid 16.67%, corrosives 16.67%, snake bite (14.59%) [Vasculotoxic snake bite and Neurotoxic snake bite cases were 08.33 % and 06.26% respectively] and organophosphorus 13.21 %.

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Case report

AN UNUSUAL COUPLE SUICIDE: A CASE REPORT
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Case report

AN UNUSUAL COUPLE SUICIDE: A CASE REPORT

Dr. SH Bhosle, Dr. MD Dake, Dr. NP Zanjad, Dr. HV Godbole

Abstract:

Murder-suicide and suicide pact episodes have a devastating impact on society. These episodes most commonly involve spouses. The death of a newly married young couple within very short period raises doubt of murder-suicide or suicide pact and is very interesting from the perspective of autopsy surgeon. In this report we discussed an autopsy case of couple suicide brought with alleged history of murder-suicide. The thorough detailed autopsies finally conclude the cause and the manner of death.

Introduction:

Suicidal deaths are important social health problem. Every day in India many persons lose their life by committing suicide because of physical, social, economic and emotional reasons[1]. The death of young married couple usually raises suspicion of either murder-suicide or suicide pact. The episodes of dyadic death & suicide pact not only had devastating effect on the families involved, but also have psychological impact on society. Murder-suicide is defined as lethal event in which an individual kills another and commits suicide immediately or within short period[2]. Most murder-suicides are spousal /consortial, involving a man killing his wife, girlfriend, ex-wife, or ex-girlfriend[3].

Suicide pact is defined as mutual agreements between two or more people to end their lives at the same time and nearly always in the same place[4]. The suicide pacts almost always involve people well known to each other, mostly lovers or spouses[5]. Cases of murder-suicide and suicide pact generate interest in the media and are also discussed in the medical literature. Here we present an interesting case of death of newly married couple brought as suspected murder-suicide which later turned out to be suicide by wife followed by suicide by husband after one day. The case cannot be categorized under suicide pact as the causative /precipitating factors for committing suicide in both cases were different and also it occurred at different times. We also discussed circumstances and psychosocial characteristics of the couple suicide.

Case Report:

The dead bodies of a newly married couple were brought for autopsy with alleged history of murder of wife followed by suicide of husband. The couple was originally native of Andhra Pradesh and migrated to Nanded (Maharashtra) few months ago in pursuit of job. The neighbors narrated about frequent quarrels between the couple and also informed that couple had quarrel in the morning on the day of woman's death. The husband telephonically informed news of death of his wife to their parents, but didn't inform Police. He preserved the dead body in portable cold chamber as it was not possible for their relatives to reach Nanded immediately. On arrival of their parents one day after the incidence, he narrated the story of sudden unconsciousness and death of his wife. Parents of deceased female suspected some foul play regarding death of their daughter and immediately rushed to police station to file a complaint. By the time police reached the scene of crime, the husband committed suicide by hanging in the bedroom, while his parents were in outside hall. Both bodies were sent them for autopsy to Department of Forensic Medicine, Dr. Shankarrao Chavan Government Medical College, Nanded (Maharashtra).

Autopsy Findings:
Female- The deceased female was moderately built. The body was very cold & showed pink colored lividity due to preservation in cold chamber. On external examination, five to six days old multiple horizontal, parallel and superficial incisions were present over front of left wrist. There was no any fresh injury over body. On internal examination, stomach showed about 200 ml of brownish fluid material with insecticidal smell and the mucosa was congested, hemorrhagic & also eroded at places. Viscera were preserved for chemical analysis which revealed insecticidal compound.
Opinion as to cause of death: Insecticidal Poisoning.
Manner of death: Considering the autopsy findings and Police report, manner of death was most likely 'Suicidal'

Male- The deceased male was moderately built. Green colored nylon rope was seen around neck with running noose at right sub-mandibular region. The dried salivary stains were observed passing downwards from left angle of mouth. Oblique, grooved ligature mark above the level of thyroid prominence was present over neck corresponding to nylon rope with knot impression below right angle of mandible. Apart from ligature mark over neck, five to six days old multiple, horizontal, parallel and superficial incisions were present over front of left wrist. Sub pleural and sub pericardial petechial hemorrhages were present. All organs were congested and dark fluid blood was present in heart & large vessels. No any internal injury was found. Stomach contained 100 ml brownish fluid material without any peculiar smell.
Opinion as to cause of death: Asphyxia due to Hanging.

Discussion:
The rate of suicide varies greatly from country to country, with the greatest burdens in developing countries. Suicide is the result of multiple factors, although one factor is eventually identified as the main causative/precipitating factor. In the present case during postmortem examination of wife, we found insecticidal compound in stomach of the deceased female without any signs of struggle which indicates strong possibility of suicidal manner of poisoning. The frequent quarrels in couple indicate marital disharmony which is one of the most important reason of suicide in married people[6]. Presence of multiple superficial, old incisions over left wrists of the couple signified previous self-harm which is also a major risk factor for committing suicide[7].

In present case, as the husband was the only witness of his wife's terminal condition and also knew the circumstances of her death; he might be aware about consumption of insecticide compound by her. In such cases of poisoning many times evidences of poisoning are found at place of incidence in the form of vomiting or empty bottles of poison. But in present case no such findings were present at the crime scene. This might be due to delay in reporting the case to police and evidences of poisoning might have been removed by the husband to hide cause of death in an attempt to avoid further legal consequences. Domestic quarrels between them were known to parents of the couple as a result of which the husband tried to conceal the actual cause of death of his wife to anyone; but, it was revealed on autopsy being insecticidal poisoning.

The death of newly married young female always raises suspicion. Parents of female rushed to police station to inform police and launch complaint. Suicide by males facing legal consequences following death of their wives is known phenomenon and not a rare occurrence. In present case, parents of wife rushed to police station & lodged complaint. The fear of impending

legal action was triggering/precipitating factor for committing suicide by husband. This results in clustering of suicide in family over very short period. Agerbo E[8] suggested from his study that, the suicide or mental illness of a spouse imposes an environmental rather than a genetic influence.

Hawton et al[7] reported that most people who die by suicide have psychiatric disorders, notably mood, substance-related, anxiety, psychotic, and personality disorders. However psychiatric disorders are not reported being main reason for suicide in developing countries[1,6]. In the present case the relatives did not report any psychiatric illness, or any suicidal behavior was known in both of them. The information given by parents may not be accurate as the relations and/or friends attending the inquest might not divulge if a psychiatric illness was present, due to the stigma attached[6]. But on autopsy we found old superficial tentative cuts on left wrist of husband & wife indicating suicidal attempt and/or attention seeking personality trait.

In present case the couple had migrated to Maharashtra few months ago for earning and now living away from other family members. The language used by people in Maharashtra for social interaction is different from their mother tongue. As a result of these things they might be socially isolated and no close one was available to share their disputes/emotions and counsel them to solve their problem. The counseling and psychiatrist's intervention might have helped the couple to deal their problems and could have avoided suicides in both.

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Case Report

A REPORT OF DYADIC DEATH WITH MOTHER AS PERPETRATOR
Dr. RK Gadhari, Dr. NA Devraj, Dr. AG Pathak, Dr. KM Chaudhari

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Case Report

A REPORT OF DYADIC DEATH WITH MOTHER AS PERPETRATOR
Dr. RK Gadhari, Dr. NA Devraj, Dr. AG Pathak, Dr. KM Chaudhari

Abstract-
          Murder-suicide also referred to as homicide-suicide or dyadic death referred to an incident where a homicide is committed followed by perpetrator's suicide almost immediately or soon after the homicide. Homicide-suicides are relatively uncommon and vary from region to region. This is a report of a homicide-suicide of a mother and her 2 children below 5 years of age.

Keywords- dyadic death, homicide-suicide, drowning.

Introduction
          Murder-suicide also referred to as homicide-suicide or dyadic death referred to an incident where a homicide is committed followed by perpetrator's suicide almost immediately or soon after the homicide. Homicide-suicides are relatively uncommon and vary from region to region[1,2,3]. So in situations, where murder has occurred and perpetrator has found dead at the scene, the most likely scenario is that this represents homicide-suicide or dyadic death[1,4,5]. Marzuk et al classified murder-suicide as a homicide followed by the suicide of the assailant within a week, typical cases where the victim and assailant are known and suicide of the assailant rapidly follows the killing of the victim[1,3]. The Hanzlick-Koponen typology has the following special classifications, which can be divided into 2 broad categories: single victim and multiple victim events[3,6].
          Drowning is form of death in which the atmospheric air is prevented from entering the lungs due to submersion of the body in water or any other fluid medium. Sometimes people who commit suicide by drowning tie their hands and feet together or attach heavy weight to their person before plunging into water. Injuries are generally absent but may be found on the body coming accidentally into violent contact with a hard object during a fall in the water[7]. Majority of deaths due to drowning are either by an accident or by suicide[8].

Case report-
          A 26 year old married Hindu female committed suicide by drowning after killing her 2 sons aged 4 years and 2 years respectively by throwing them in the well water. Bodies were brought for postmortem examination at Government Medical College, Dhule.

Postmortem findings in mother-
1. External examination- clothes were intact and wet. Hands and legs not tied. Cyanosis was present over finger nail beds. On pressing the chest, typical froth of drowning (white, lathery, tenacious, copious, blood tinged) oozed out from nostrils. No injuries were present.
2. Internal examination- Larynx, trachea and bronchi were intact; mucosa was congested and showing fine white froth. Both lungs were intact, congested, voluminous, heavy and edematous. Rib markings present over surfaces of both lungs. On cut sections of both lungs showed blood tinged froth oozing through the cut surfaces of lungs. Weights- right- 500gm, left- 450gm. Stomach was intact, contains about 250cc watery fluid, no peculiar smell, mucosa congested. No injury to internal organs. Uterus was non-gravid. No disease pathology was present.

Photo 1- autopsy photograph of perpetrator mother

Photo 2- autopsy photograph of lungs showing frothy fluid oozing from bronchi

3. Blood and viscera samples were preserved for chemical analysis. Report of chemical analysis did not reveal any poison in the samples.

Based on postmortem findings and report of chemical analysis cause of death was given as asphyxia due to drowning.

Postmortem findings in son aged 4 years-
1. External examination- clothes were intact and wet. Hands and legs not tied. Cyanosis was present over finger nail beds. Typical froth of drowning (white, lathery, tenacious, copious, blood tinged) was oozing from nostrils. No injuries were present.
2. Internal examination- Larynx, trachea and bronchi were intact; mucosa was congested and showing fine white froth. Both lungs were intact, congested, voluminous, heavy and edematous. Rib markings present over surfaces of both lungs. On cut sections of both lungs showed blood tinged froth oozing through the cut surfaces of lungs. Weights- right- 250gm, left- 200gm. Stomach was intact, contains about 100cc watery fluid, no peculiar smell, mucosa congested. No injury to internal organs.
3. Blood and viscera samples were preserved for chemical analysis. Report of chemical analysis did not reveal any poison in the samples.
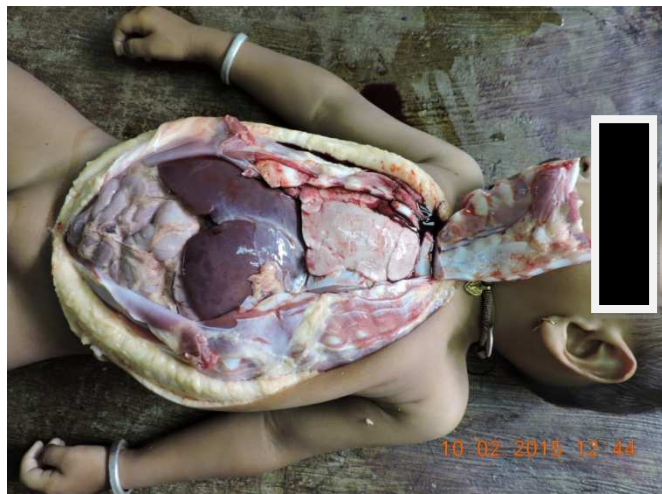
Based on postmortem findings and report of chemical analysis cause of death was given as asphyxia due to drowning.

Photo 3- autopsy photograph of victim son aged 4 years with froth at nostrils

Photo 4- autopsy photograph of cut section of victim's lung: frothy blood tinged froth

Postmortem findings in son aged 2 years-

1.   External examination- clothes were intact and wet. Hands and legs not tied. Cyanosis was present over finger nail beds. Typical froth of drowning (white, lathery, tenacious, copious, blood tinged) was oozing from nostrils. No injuries were present.
Internal examination- Larynx, trachea and bronchi were intact; mucosa was congested and showing fine white froth. Both lungs were intact, congested, voluminous, heavy and edematous. (Photo 5- autopsy photograph of victim son aged 2 years with pulmonary edema) Rib markings present over surfaces of both lungs. On cut sections of both lungs showed blood tinged froth oozing through the cut surfaces of lungs. Weights- right-220gm, left- 170gm. Stomach was intact, contains about 150cc watery fluid, no peculiar smell, mucosa congested. No injury to internal organs.

2. Blood and viscera samples were preserved for chemical analysis. Report of chemical analysis did not reveal any poison in the samples.

Based on postmortem findings and report of chemical analysis cause of death was given as asphyxia due to drowning.

Discussion:

        In these cases a bizarre dyadic death was perpetrated by a married lady who was housewife, and was from lower socioeconomic strata, residing in a small village. She committed suicide immediately after throwing her 2 sons into the well. The postmortem interval was same (6 to 12 hours) in all the 3 dead bodies. History revealed that she was not under any kind of psychiatric treatment. No suicide note was found. History of marital quarrels/cruelty to married lady regarding dowry was present. So, it was found that she was under some kind of stress since a week before the tragic event. Her husband who was a daily wage worker used to earn a meager income and was alcoholic. She used to live separately from her in-laws. After we issued the postmortem report the police authorities recorded a case under 306 IPC for abetment of suicide and section 498 of IPC for cruelty towards married woman against her husband and in-laws and a case of murder of her 2 children against her under section 302 of IPC.

Table 1: showing details about victims, accused and cause of death-

Perpetrator	Relationship of victim with perpetrator		Cause of death	
			victim	perpetrator
Mother (26 years)	Elder son (4 years)	Younger son (2 years)	Asphyxia due to drowning	Asphyxia due to drowning

        Milroy et al had reported that of 52 cases of homicide-suicide pact studied, common causes are breakdown in a relationship (46%), mental illness (21%), physical ill-health (11%), financial stress (10%)[3,9]. Bossarte et al observed that shooting (80.4%), sharp weapon injuries (11%), hanging (6%), poisoning (4%), fall from height (3%), burns (1%) and vehicular injuries are common methods of suicide in perpetrators of dyadic deaths[3,10]. In the Indian scenario financial burden and marital disharmony are the principal reasons for dyadic

deaths. Such suicidal tendencies are now commonly seen in farmers due to agrarian crisis and unemployed youths making them vulnerable populations[3,11,12]. Bardale et al reported 2 different cases of dyadic deaths in which perpetrator were married mothers who committed suicide by drowning in water and killed their children aged 18 months and 6 years by throwing them into the waters respectively[13]. The reason being family dispute and financial hardship similar to our case report. Gupta S et al[14], Dhawane SG et al[15] and Gupta BD et al[16] had described homicide-suicide episodes involving male as a perpetrator but only few reports with mother as perpetrator had been published[13,17]. In our case the perpetrator killed not one but two immediate family members.

When comparing homicides with dyadic deaths, research suggests that the perpetrator is more likely to commit the later when the motive is related to possessiveness, jealousy, sickness or stress and these incidents are more likely to be premeditated than a homicide alone[18].

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Review Article

E-LEARNING FOR MEDICAL EDUCATION IN INDIA: A REVIEW
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Review Article

E-LEARNING FOR MEDICAL EDUCATION IN INDIA: A REVIEW

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Abstract:

With the shortage of trained faculty and increase in number of medical students in India, Online resources can reach out across time and space barriers. E-learning is the use of Internet technologies to enhance knowledge and performance. E-learning is also called Web-based learning, online learning, distributed learning, computer-assisted instruction, or Internet-based learning. E-learning technologies offer learners control over content, learning sequence, pace of learning, time, and often media, allowing them to tailor their experiences to meet their personal learning objectives. In the face of severe faculty shortages in resource-constrained countries, medical schools look to e-learning for improved access to medical education. The integration of e-learning into medical education can catalyze the shift toward applying adult learning theory, where educators will no longer serve mainly as the distributors of content, but will become more involved as facilitators of learning and assessors of competency. The current article discusses the emergence of E learning in medical education, its components, and tools of e learning, focusing on the merits and demerits of E learning. The article also discusses the integration and the future of e learning in medical education

Key words: E-learning, medical education, technology

Introduction:

Learning is the sharing or transfer of information between two parties. The role of a doctor is to be an organiser, communicator and therapist in the following five activities: health promotion, disease prevention, treatment of the diseased, rehabilitation of the recovered, constant learning. [1] Today's medical educators have different challenges compared to previous generation in teaching tomorrow's physicians. In the recent times , rapid changes in health care delivery system and advances in medicine have increased demands on academic faculty, resulting in less time for teaching than has previously been the case. [2] Current health care delivery and medical education system , is shifting its focus from acute care institutions to community-based settings. Traditional instructor- centered teaching is moving towards a learner-centered model that puts learners in control of their own learning. These recent changes toward competency-based curriculum emphasize the learning outcome, not the process, of education. [3] E-learning refers to the use of Internet technologies to deliver a broad array of solutions that enhance knowledge and performance. [4] E-learning can be used by medical educators to improve the efficiency and effectiveness of educational interventions in the face of the social, scientific, and pedagogical challenges noted above. It has gained popularity in the past decade; however, its use is highly variable among medical schools and appears to be more common in basic science courses than in clinical clerkships. [5][6]

The current article reviews the state of e-learning in medical education by outlining the following: history, the components and tools in e-learning, its merits and demerits. The article also discusses the integration and the future of e learning in medical education.

History of E- learning:

The letter 'e' in e-learning stands for the word 'electronic'. E-learning pioneer BERNARD LUSKIN (2001) explains `e' as exciting, energetic, enthusiastic, emotional, extended and educational. E-learning is internet-enabled learning. It is a store house of education, information, communication, training, knowledge and performance management. [7]

E-learning encompasses a pedagogical approach that typically aspires to be flexible, engaging and learner–centred; one that encourages interaction (staff–staff, staff–student, student–student), and collaboration and communication, often synchronously or asynchronously. [8] The Internet is an infrastructure connecting computers by telecommunication, i.e. the Internet is a world computer network. This literally means that this is the biggest network in the world connecting millions of PCs, local (LAN) and wide (WAN) are networks in a single network. The Internet can be defined as a work computer information network, consisting of a large number of smaller interconnected computer networks, enabling information transfer between computers in a network. Therefore, the Internet could be defined as a network of all networks. In the second half of the 20th century, at the time of strained relations between the East and the West, it was this constant apprehension of possible war that gave birth to a desire to be ahead of the opponent and gave the world various products and technological innovations which would never have been possible had the Cold War not taken place. Thus some historians think the Internet is one more beneficial fall-out of the War. The Internet was established in 1969, when ARPA (Advanced Research Projects Agency) founded and financed by the American government within the USA Ministry of Defence, was assigned with a task to redesign the manner in which computers function. The result of this work was the creation of ARPANET - the first computer network. ARPANET was originally designed for enabling high efficacy in communication among the USA research centres, universities and governmental organisations and soon grew into an international network available to one and all. The development of the Internet as a global network primarily depended on the development of communication means. Invention of the telegraph, telephone, radio and computer was the basis for Internet creation.

The Internet development can be viewed in the following chronology:
- 1969 – the USA Ministry of Defence builds the first test network and ARPANET is created;
- 1971 – Ray Tomlinson creates the first programme for electronic mail and e-mail is created;
- 1972 – Telnet is developed which allows work on distant computers;
- 1973 – FTP (File Transfer Protocol) is established which becomes the standard for data transfer within the network;
- 1979 – USENET news server network with thematic groups is created;
- 1983 – TCP/IP protocol is standardised and the term 'INTERNET' as a name for a 'network of all networks' is first used;
- 1986 – NNTP (Network News Transfer Protocol) becomes the standard for the connection between news servers connected in the USENET network on the Internet;
- 1989 – the number of computers exceeds 100,000.
- 1991 – WWW (World Wide Web) is developed, and the number of computers connected to the Internet exceeds 1,000,000.

Internet use became necessary in health care as well, and in one of expert medical magazines the following message was published for doctors "Get online–or get left behind". (9) (10) (11) (12) (13).

Types of e- learning:

There have been two common e-learning modes: distance learning and computer-assisted instruction. Distance learning uses information technologies to deliver from a central site, instruction to learners who are at remote locations. Computer-assisted instruction (CAL) uses computers to aid in the delivery of stand-alone multimedia packages for learning and teaching. (14)

Tools in e- learning:

Creating e-learning material involves development of contents which can be managed, delivered, and standardized. This involves hardware & software components.

Hardware

Web Server: A Computer that can run a computer program responsible for accepting HTTP (Hypertext transfer protocol) requests from web clients known as web browsers, and serving them HTTP responses along with optional data contents, which usually are web pages such as HTML (Hypertext markup language) documents and linked objects like images. At the student end, apart from standard Internet browsers, multimedia appliances like headset, web cam may be optionally required.

Software

a. A solution stack of software, usually free and open source software (FOSS), used to run dynamic Web sites or servers. Examples - Linux - Operating System Apache - Apache Web Server MySQL - Database Management System (Database Server) PHP - Hypertext Preprocessor (Scripting Language)

b. Learning Management System: Commonly used free ones are: Moodle (http://moodle.org) and a Tutor (http://atutor.ca/).

c. Free lesson construction software to build a teaching website: like Hot Potatoes: (http://hotpot.uvic.ca/)

d. Blog Publishing System: A commonly used free one is WordPress (http://wordpress.org/) is a blog publishing system written in PHP. All data is stored in a MySQL database.

e. Wiki software: A commonly used free one is MediaWiki (http://www.mediawiki.org/wiki /MediaWiki), which is a web-based wiki software application used by all projects of the Wikimedia Foundation, and many other wikis, including Wikipedia and Citizendium.

f. Videoconferencing (Desktop): a PC or laptop can be used for videoconferencing using the freeware Skype or Dimdim.

Human Resources

a. Content Developers: Subject or Domain Experts - Subject Matter Experts - they would decide on the actual content (text, slideshows, audios, still images, videos - of lectures or of procedures, blogs, wikis, podcasts, mailing lists or even videoconferencing units). For more advanced medical institutes, the course may be connected with the Hospital Information System, PACS (Picture archiving and communication system) and EMR (Electronic medical records).

b. Web administrators: To design, develop and maintain (update) the site. They should be ably supported by the Network administrators of the Institute.

c.   Instructors / Tutors / Mentors: To monitor and assist the day to day progress of the students - they may or may not themselves be content developers. [15][16]

Merits of E learning in Medical Education

- No time is spent commuting to class and the courses can be availed from physically remote locations, provided Internet connectivity is present.
- No travel costs are involved.
- One can have a job or pursue some other interests while one attends such courses.
- One can learn when one needs it (Just-In-Time or "*synchronous*", as well as "*asynchronous*" - where the students interact with the other students or faculty at different times).
- One can learn at one's own pace.
- Instructions can be more customized and flexible.
- Can increase student to student interactions, *i.e.*, peer group learning and higher comfort level.
- Can lower costs for both learning providers and organizations that need training
- Can offer lower costs for students than in traditional programs
- Additional benefits include learning new technologies and technical skills
- In a nutshell, it may be termed as "right knowledge at the right time in the right way".

Demerits of e-learning in medical education

- Instructors need to learn to be effective online instructors and to convert face-to-face contents online. Confidence and attitude are likely to develop over time and training.
- Need for suboptimal Time management (by both students and faculty).
- Internet Connectivity and / or Access problems.
- More time consuming for instructors to provide individualized feedback (because more learners are often actively involved).
- Equipment needs of students and learning providers, involving the cost and adaptability to new technology, as well as, overcoming mundane problems like virus, spam and phishing attacks.
- Need for ongoing technical training and support of learners and instructors.
- Academic honesty of online students is difficult to monitor.
- Need for various types and effectiveness of assessments.
- Lack of face to face interaction.
- Equality of access to learners of all backgrounds and parts of society.
- Requires new skills and responsibilities from learners.
- Does not provide many social aspects of a true campus or traditional classroom.
- Waning enthusiasm and ignorance. [17][18][19]

Integrating e-Learning into medical education

The integration of e-learning into existing medical curriculum requires a well-devised plan that begins with a need assessment and concludes with the decision to use e-learning. In medical education content can be delivered either synchronously or asynchronously. Synchronous delivery refers to real-time, instructor-led e-learning, where all learners receive information simultaneously and communicate directly with other learners. With asynchronous delivery, the transmission and receipt of information do not occur simultaneously. The learners are responsible for pacing their own self- instruction and learning. The instructor and learners communicate using e-mail or feedback technologies, but not in real time. [20]

Blended learning combines e-learning tools with traditional classroom learning to ensure maximum effectiveness. It offers-

1. Face to face interaction thereby leading to social benefits.
2. Personalized system of instruction which requires minimum interaction.
3. Improved retention and reinforcement through follow-up mechanism on the web.
4. Highly flexible based on the learning style and the level of audience.

Evidence suggests that blended -learning is more efficient in most cases because learners gain knowledge, skills, and attitudes faster than through traditional instructor-based methods. This efficiency translates into improved motivation and performance. [21]

Future of e-learning in medical education

Training of physicians in the 21st century requires a new focus on emerging competencies. With the ACGME's (Accreditation Council of Graduate Medical Education) mandate required of all U.S. residency training programs, residents have to demonstrate their competence in six core areas, including: (1) patient care, (2) medical knowledge, (3) practice-based learning and improvement, (4) interpersonal and communication skills, (5) professionalism, and (6) systems-based practice. There is an increasing need to restructure medical education from a knowledge-based towards a competency-based medicine.

The current e-learning integration in medical education can target the following competence skills in future physicians:

- Patient-centred communication skills
- Competence in providing culturally sensitive care
- Exhibiting professionalism in all aspects of a physician's life
- Exercising evidence-based decision making
- Patient safety/medical error reduction
- Inter-professional team care
- Life-long learning
- Continuous self-assessment
- Improving practice performance
- Evidence-based critical thinking and clinical reasoning
- There are three e-learning modalities that promise a great potential for innovative training in the future. These modalities include: (1) simulation technology; (2) synchronous learning delivery; and (3) Web-based or videoconferencing for standardized patient-based training. [22][23]

Conclusion

The interface between educational technology and medical sciences is integral and symbiotic. Innovations in e-learning technologies point towards a revolution in education, allowing adaptive and collaborative learning by the learners and transforming the role of the teacher. The advent of information technology and communication (ITC) leads to significant developments in the field of health and have different impacts on professional practice, the experience of patients, management and organization of health system.

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