Original Article

SOCIODEMOGRAPHIC PROFILE OF PATIENTS WITH ACUTE POISONING IN THE EMERGENCY WARDS OF A TERTIARY CARE HOSPITAL

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ABSTRACT

Objective: To assess the socio-demographic profile and outcomes in the patients with poisoning admitted to the emergency wards of a tertiary care hospital.

Methods: The prospective observational study was conducted for a period of six months in the emergency wards of a tertiary care hospital. The demographic data, hospital admission variables and outcomes were collected from various sources and documented. Cluster analysis was used to find the interaction between the socio-demographic and hospital admission variables in association with outcomes of poisoning.

Results: A total of 133 patients were admitted with acute poisoning. The mean age was 27.76±15.5%. Females (51.1%) were dominant over males (48.8%). Incidents of poisoning were predominant in married (49.6%), literates (41.35%), abiding in urban region (86.4%) and belonging to upper lower class (37.6%). The poisonings were intentional (69.17%) occurring through oral route (81.2%) at home (82%). Reason for poisoning was the most significant (1.00*) predictor followed by route of poisoning. Patients with mild symptoms were 85.71% 10.5% moderate and severe symptoms 3.75%. Majority of the victims recovered (82.71%) whilst 4.51% died.

Conclusion: Poisoning patterns vary with socio-demographic and socio-economic status, which is a prevalent social and economic issue in developing countries. Depression acts as a slow poison and is common among younger age groups leading to increased cases of intentional poisoning, thereby indicating a necessity for appropriate psychiatric counselling, medical and peer management strategies to identify the individuals in need that can reduce the risk of next attempt.

Keywords: Intentional Poisoning, Socio-demographic, Psychiatric counselling

INTRODUCTION

Worldwide intentional poisoning is one of the major causes of morbidity and mortality [1]. According to the World Health Organisation (WHO) 0.3 million people die due to various poisoning agents annually [2]. In India, five to six persons per lakh of the population die due to acute poisoning every year. However, the true magnitude of suicide remains an uncertain health issue due to lack of systematic profiling of risk factors associated with poisoning [3, 4].

People who indulge in self-harm are analytically heterogeneous and may display characteristics of mental issues. Factors such as lower socioeconomic status, emotional disturbances, chronic diseases, distress due to loss of business, the stress of examinations, unemployment, marital disharmony and family problems can lead to poisoning [4, 5].

The manner of poisoning differs with age. In the paediatric age group poisoning normally arises due to accidental ingestion of commercial and harmful household products such as mothballs, flea and tick product, cleaning solutions, nail polish remover and thinner whilst in the adolescents and adults, the common mode of poisoning was intentional which occurred by consumption of medications, organophosphorus compounds and harmful household products or sanitary products [6]. The key determinants of poisoning associated deaths are due to changes in lifestyle and social behaviour, rapid industrialisation, massive use of pesticides in agriculture, increased availability of drugs and chemical substances [3, 7].

The choice of poisoning agents depends upon the socio-economic factors, demographic factors and individual medical factors which greatly varies from country to country. Hence the profile of poisoned victims, toxic agents and their treatment outcomes are necessary for the development of regional or national poison policies [8, 9].

There is a lack of sample registration system for poisoning cases in India. Previous studies have reported only about the demographic factors and their association with the poisoning outcome but there exists a complex interaction among socio-demographic variables that need to be evaluated to identify the most important predictors associated with poisoning.

Against this background, the study aimed to determine the profile and outcomes of acute poisoning in patients admitted to the emergency wards of a tertiary care hospital.

MATERIALS AND METHODS

Study site and duration

This prospective observational study approved by the institutional ethics committee (Registration No: ECR/215/Inst/Ker/2013) was conducted for a duration of six months (November 2016-April 2017) in the emergency wards of a tertiary care hospital located in the North of Bangalore chiefly catering to the demands of the urban population.

Inclusion and exclusion criteria

A total of 1538 medicolegal cases were observed within a time period of six months among which 1331 cases were excluded as they were with self-inflicted wounds, burns, injuries, ingestion of non-digestible substances such as pins, coins and plastics, vehicular accidents, suspected murder, sexual assault and criminal abortion. About 207 cases of acute poisonings were brought directly or transferred from other hospitals or emergency teams. As a part of the ethical requirement written informed consent was obtained from the 133 poisoning victims, approval from the remaining 74 patients wasn't possible due to reasons such as critical condition, extent of willingness of the victim to provide the poisoning details,

hospitalisation during the night and discharges against medical advice due to lack of availability of beds and other reasons.

Data collection

A structured validated proforma was suitably designed, the data regarding the demographic details, mode of poisoning, route and location of poisoning, hospital admission characteristics and outcomes of the poisoning victims were collected and recorded by a trained investigator.

Sources of data

The patients admitted with acute poisoning received first aid in the emergency wards and were further managed by shifting them to intensive care unit/wards depending on their condition. Relevant patient's information was obtained from various sources such as patient's case records, medication charts, laboratory data, medico-legal case registers and by self-interviewing the victims who were in a state of providing response (one to one interview) followed by their caretaker/families regarding the past history, circumstances that led to poisoning and emotional disturbances along with information regarding contents of the poisoning agent, severity of the poisoning, treatment being provided from the healthcare

professionals. This data contributed meaningfully and effectively towards the study and was documented by a trained investigator into the proforma and transcribed into a database created using Microsoft Access.

Variables

The variables selected included patient sociodemographic variables such as age, gender, marital status, the location of residence, level of education, occupation and social class that was obtained from all the patients included in the study. Age was categorised as ≤ 30 y and>30 y, gender was noted as male or female, the location of residence as urban and sub-urban, marital status as married and unmarried, level of education as illiterate and literate, occupation as homemakers, job holders, self-employed, agriculturist, students, retired and according to the Kuppuswamy's socio-economic scale social class was classified as upper, upper middle, upper lower, lower. Hospital admission variables included reason for poisoning, location of exposure, route of poisoning, hospitalisation time after exposure, number of days in the hospital, mental illness, co-morbidities and the consciousness of the victim on time of admission assessed based on the Glasgow Coma Scale and outcomes of the acute poisoning in patients were categorised as recovered, death, discharge against medical advice.

Glasgow coma scale

Eye-opening response	Verbal response	Motor response
4 = Spontaneous	5 = Oriented	6 = Obeys commands
3 = To verbal stimuli	4 = Confused	5 = Localises pain
2 = To pain	3 = Inappropriate words	4 = Withdraws from pain
1 = None	2 = Incoherent	3 = Flexion to pain or decorticate
	1 = None	2 = Extension to pain or decerebrate
		1 = None

Data analysis

To examine whether there was interaction among the socio-demographic and hospital admission variables over time for the poisoning as outcome variables, a series of chi-square analyses were conducted across the dataset. To examine whether clusters of patients could be identified, a two-step cluster analysis was carried out on the dataset using SPSS 22.0 (SPSS, Inc, Chicago IL, USA). The two-step cluster analytic method was chosen as it allows for the identification of groups in datasets containing both categorical and continuous variables, and without having to preselect the number of clusters. Step 1 involved pre-clustering in which the original variables were 'sorted' into pre-clusters. Step 2 involved standard hierarchical clustering on the pre-clusters formed in Step 1 based on Schwartz's Bayesian Information Criterion (BIC). The number of clusters was chosen based on a change in BIC being small between adjacent clusters. Examination of the silhouette coefficient, which contrasts the average distance to elements in the same cluster with the average distance to elements in other clusters which should be ≥0.02. Between-cluster tests for a variable were not significant, the cluster analysis was rerun with the variable deleted. In this way, this iterative process looked for the most relevant variables which would add to an interpretable solution. Accordingly, several analyses were run for selection of variables and a number of variables were excluded as they were not found to be important in cluster partitioning. Later chi-square tests to identify the importance of variables in a cluster and indicate significant differences between clusters.

RESULTS

A total of 133 acute poisoning patients hospitalized during the study period in the emergency department of a tertiary care hospital were analysed.

Sociodemographic characteristics

The poisoning cases were classified as per age, gender, marital status, occupation, educational background, the location of residence, socio-economic stratum (table 1). Among the total study population,77(57.89%) patients were ≤ 30 y with a mean age of 27.76±15.5. Poisoning was equally distributed among both females (51.1%) and males (48.8%). Married groups (49.6%) outnumbered

the unmarried (36.0%). Regarding the occupation status majority of the patients were homemakers (27.6%) tailed by job holders (25.56%). However, in light with education, incidents were higher in patients with higher level of education (41.35%) and residing in urban areas (86.4%) Kuppuswamy's Socio-economic Scale was utilised and poisoning was predominant in the upper lower class (37.6%) and lower middle (29.31%).

Hospital admission characteristics

Study background of poisoning displayed 67.4% cases were of suicidal intent with the major route of exposure being ingestion (81.2%). The incidents of poisoning significantly occurred at home (82.0%) when compared to the workplace (10.5%). The time of exposure to the poisoning agent was in the evening hours (30.53%) and with regard to the time elapsed from the toxic agent exposure to hospitalisation, 66.2% arrived at the hospital in a time duration ≥1 hour. The hospital stays of the patients admitted with poisoning ranged between a minimum of 1 d to a maximum of 18 d (in a victim with acid ingestion) where 65.4% were in the hospital for ≤ 1 d. Among the total poisoning victims, 13% were diagnosed to have psychiatric abnormalities such as depression, schizophrenia and bipolar disorders. Comorbidities such as endocrinological, hepatic, renal, neurological, haematological, respiratory, cardiovascular and urological disorders were observed in 27% (table 2). The severity of poisoning was determined using the Glasgow Coma Scale and a majority of the patients with mild and moderate symptoms recovered. The outcomes among the poisoning victims revealed recovery in 110(82.7%) followed by 17(12.7%) discharge against medical advice and 6 (4.51%) death (fig. 1).

Significant difference between cluster 1 (N=45) and cluster 2 (N=88), was found regarding gender (χ2=7.25, p=0.007), marital status (χ2=29.11, p<0.001*), location of residence (χ2=9.90, p=0.001*), reason of poisoning (χ2=103.5, p<0.001*) and location of poisoning (χ2=24.13, p<0.001*) (table 3).

The contribution of socio-demographic and attendance variables to the cluster formation was evaluated and predictor importance for each variable on outcome was determined. Reason for poisoning had highest significant predictor importance followed by the route of poisoning and marital status. Age was the least significant among the predict.

Table 1: Demographic characteristics

Variables	n(%)=133
Mean age	27.76±15*
Age	
<30 y	77(58.77)
≥30 y	56(42.1)
Gender	
Male	65(48.8)
Female	68(51.1)
Marital status	
Single	48(36.0)
Married	66(49.6)
Others	19(14.2)
Location of residence	
Urban	115(86.4)
Semi-urban	18(13.5)
Social class	
Upper	04(3.0)
Upper middle	21(15.8)
Lower middle	39(29.3)
Upper lower	50(37.6)
Lower	19(14.3)

*mean±SD*n=Number of participants

Table 2: Hospital admission characteristics

Variable	n(%)=133
Reason for poisoning	
Intentional	92(69.17)
Non-Intentional	41(32.6)
Route of poisoning	
Ingestion	108(81.2)
Other route	25(18.8)
Location of exposure	
Home	109(82.0)
Workplace	14(10.5)
Others	10(7.5)
Hospitalisation time after exposure	
≤60 min	45(33.8)
>60 min	88(66.2)
No. of days in hospital	
≤1 d	87(65.4)
>1 d	46(34.5)
Mental illness	
Present	13(9.7)
Absent	120(90.3)
Comorbidities	
Present	36(27.0)
Absent	97(73.0)

Table 3: Characteristics of the two clusters

| Variables	Cluster 1 n (%) =45	Cluster 2 n (%) = 88	Chi square value	P-value
Mean age*	26.63±21.57	29.58±10.4	-	-
Gender				
Male	29 (64.4)	35 (39.8)	7.2597	*.007**
Female	16 (35.5)	53 (60.2)		
Marital status				
Single	09 (20.0)	40 (45.4)	29.1159	*<0.001**
Married	19 (42.2)	45 (51.2)		
Others	17 (37.7)	03 (3.4)		
Location of residence				
Urban	34(75.5)	83 (94.3)	9.9044	*0.001**
Semi urban/rural	11(24.5)	05 (5.7)		
Mental illness				
Present	04(8.9)	11(12.5)	0.388	0.533
Absent	41(91.1)	77 (87.5)		
Comorbidities				
Present	11 (24.5)	25 (28.4)	0.2371	0.626
Absent	34 (75.5)	63 (71.6)		
Reason for poisoning				
Intentional	06(13.3)	87 (98.8)	103.5724	*<0.001**
Non-Intentional	39 (86.7)	01 (01.2)		
Location of exposure				
Home	26 (57.8)	83 (94.3)	24.13	*<0.001**
Workplace	10 (22.2)	04(4.54)		
Others	07 (15.5)	03 (3.4)		
Route of poisoning				
Ingestion	22 (48.8)	88 (100)	-	-
Other route	23 (51.1)	0(0)		

*mean±SD; *n= Number of participants
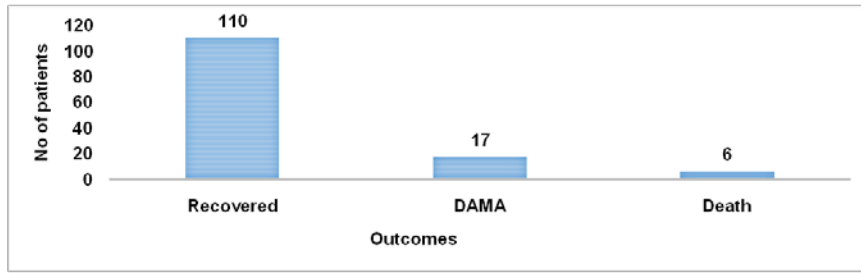
Fig. 1: Outcomes of poisoning patients, *DAMA: discharge against medical advice

Table 4: Contribution of socio-demographic and attendance variables to the cluster formation

Variable	P-imp
Reason for poisoning	1.00*
Route of poisoning	0.54*
Marital status	0.28*
Location of poisoning	0.21*
Residence location	0.12*
Gender	0.10*
Number of days in hospital	0.04*
Mental health	0.03*
Age	0.02*
Comorbidities	0.01
Glasgow coma scale	0.01
Hospitalisation time after exposure	0.01
Social class	0.01

P-imp, predictor importance; *$P<0.01$, Cluster 1=45(33.8%), Cluster 2= 88(66.2%)
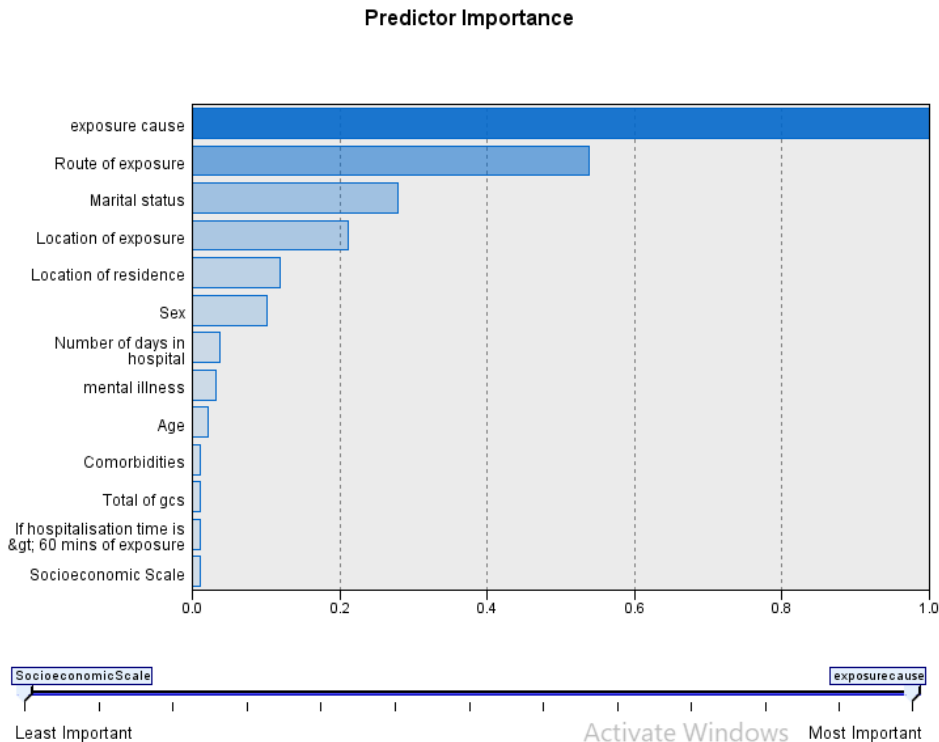
Predictor Importance

Fig. 2: Predictor importance of data variables

DISCUSSION

In developed countries, the rate of mortality from poisoning is testified to be 1% to 2% which is comparatively less to developing countries like India where more than 50,000 deaths occur due to toxic exposure [10, 11]. Karnataka places fourth in the list of states with a high rate of suicides, while Bangalore records the second highest in the cities [12]. Data from previous studies in India have provided information regarding the direct association of demographic factors with the outcomes. Even though previous studies had described the socio-demographic profile of the poisoning victims, none have sought to investigate the clusters of the

victims in a way that allows identifying the relationship between the socio-demographic and hospital admission characteristics that can influence the outcome of poisoning. We assumed the demographic variables alone to be insufficient, hence conducted the study to understand the interaction between the demographic and hospital attendance characteristics along with the most important predictor associated with poisoning.

The National Survey on Drug Use and Health (2009-2014) data indicate 18-25 y old had higher percentages of suicidal thoughts and attempts compared to middle-aged adults (45-to 64-year olds) [13]. In this study younger patients were significantly observed as the majority of the poisoning cases ranged in the age groups ≤30 y (57.89%). A pattern similar to this has been reported in Indian studies [14, 15]. As young adults progress through generations, their traditional households generally get less supportive of their choices pertaining to financial social sectors, marriage age, premarital sex, rehabilitation, stress in academics as well as inability in achieving the targets in professional and educational fronts [16]. With regard to the predictor importance in our study age was found to be least significant, hence we can't always attribute the reason for poisoning to age due to changing trends in the recent times where members from all age groups are equally prone to suicide attempts. Gender differences were found to be a significant predictor in this study and females (51.1%) outnumbered males (48.8%) contrary to most studies in India [17, 18]. Nonetheless, a study conducted by Heyerdahl *et al.*, in Oslo [19] displayed poisoning to be slightly higher in females than males which could be due to emotional instability, depression, physical abuse, forced marriages and post-partum psychosis [20].

In Indian studies, poisoning is commonly seen in married groups which were the third most important predictor as observed in this study findings (49.6%) [21, 22]. This can be attributed to factors such as family disharmony, marital violence, dowry issues, the concept of joint family over nuclear family setups leading to a financial burden and stress [23, 24]. Contrast to our results was a study conducted in Mysore which displayed poisoning incidents in unmarried than married [25]. The study site is located in an urban area and catering its services mainly to urban population had the majority of the poisoning cases significantly from urban areas (86.4%) and found to be the significant predictor. This was in accordance with studies conducted in a similar setting [26, 27] while contradictory to the findings from a previous study conducted in a rural setting (55.4%) [28]. With regard to occupation, homemakers (27.06%) and other vulnerable groups such as job holders (25.56%) were found in higher numbers due to reasons such as familial disharmony, dowry-related issues, stress and strain in work. These results were comparable to a study by Devendranath *et al.*, whilst contrary to a study where students outnumbered the other classes [29, 30]. The fact that in this study predominant cases were from an urban background, poisoning was observed more in literates (41.35%) which reflects the transition in the Indian society along with higher stressors commonly in this group. Findings from other studies were concurrent with our results [23, 31]. According to data from different researchers in India numerous cases of poisoning occur in lower socioeconomic class and middle-class families as low economic status has an adverse impact on a person's self-esteem and may confront to problems such as crime, violence, unemployment, financial hardship, disorder personality which can despair their emotions and can potentially induce self-harm behaviour, similarly, our results had cases from upper lower (37.6%) and lower middle class (29.3%) [16, 32] (table 1).

In light with the reason for poisoning several studies in developed and developing countries reported the commonest mode of toxicity to be suicidal [33, 34] however, most of the childhood poisonings were non-intentional and occurred in studies conducted in other parts of the world [35, 36]. The type of poisoning in our study was significantly intentional (69.17%) and the most important predictor. Increase in suicide endeavours could be because of settlement issues, lack of emotionally supportive network, illegitimate pregnancy, divorce, personal dissatisfactions, and insufficiency to adapt to some quick circumstances [24, 29]. The main route was oral ingestion (81.2%) and exposure to the poisoning agents at home

(82%) were important predictors among the study participants which was in line to the results obtained by other researchers [37, 38]. To avoid unnecessary attention majority of the patients have consumed poison in the evening hours (30.53%). This pattern of exposure to the toxic agent correlated to a study by Leena Antony *et al.*, [27]. The time elapsed between the intake of poison and arrival of the victim to the hospital was observed to be>1 hour (66.1%) concurrent to the findings by Ahmed *et al.*, while a study conducted in Nepal had more than one-third of the patients arriving within an hour of exposure [39, 40]. Delay in the admission to the hospital can be attributed to traffic-related issues, lack of ambulance facilities, a referral from other centers, insufficient knowledge regarding the incident of poisoning and responding to the victim in trouble as soon as possible. The early arrival of the patient to the hospital diagnosis and can reduce the chances of mortality.

The duration of the hospitalisation for the patients is one of the predictors in our study ranged between 0-18 d. and most of them were hospitalised for ≤ 1 d (65.4%). These findings were similar to a study conducted in the western part of India [41].

Majority of people who experience a mental illness do not die by suicide. However, of those who die from suicide, more than 90 percent have a diagnosable mental disorder which is frequently undiagnosed, or untreated [42]. In India, there is variation in the type and frequency of psychiatric disorders. Our study findings displayed mental illness (9.7%) like depression, bipolar disorders and schizophrenia to be a significant predictor which was parallel to results from various literature where people suffering from psychological disorders are more prone to suicidal attempts due to emotional instability [23, 43]. Poisoning victims with a history of endocrinological, hepatic, renal, neurological, respiratory, haematological, cardiovascular, urological and other disorders were 27%. Physical illnesses are usually associated with chronic, unremitting pain, restriction in physical mobility and recreational activities hence these complications make this group vulnerable to suicide endeavours. The severity of poisoning in the victims was assessed using the Glasgow Coma Scale and the majority of the patients presented with mild (85.71%) to moderate symptoms (10.57%) similar to a study conducted by Shoba Churi *et al.*, in Mysore [5] (table 2).

The studies conducted all over the world [33, 40, 44, 45] were parallel to our findings in which out of the total 133 poisoning cases 110 (82.71%) recovered, 17(12.7%) were discharged against medical advice and 6 (4.51%) deaths in total (fig. 1). As a majority of the patients recovered, decreased mortality could be due to appropriate emergency and intensive care management facilities in the hospital.

Firstly, the cluster analysis is an essential technique for classifying the demographic and hospital admission characteristics into predictive groups. Table 3 indicates a significant difference between both the clusters: cluster 1(n=45) and cluster 2(n=85). From table 4 the predictor importance was determined and the reason for poisoning had the highest significance while age was the least significant (fig. 2).

LIMITATIONS

The study was conducted for a short duration and all the patients were not referred for psychiatric counselling hence there was a lack of psychiatric details collected.

CONCLUSION

The present data gave an insight that intentional poisoning was the most important predictor of poisoning followed by the route of poisoning and marital status. There exists a significant interaction between sociodemographic and hospital attendance variables which influence the outcomes of poisoning.

Strict rules and regulation to restrict the over the counter sales of pharmaceutical products and toxic agents should be initiated.

The initiation of poison information centres or helplines in the country is necessary as they offer free, confidential and expert medical advice that helps in earlier management by providing in-home treatment to the victims. The poison information centres in

hospitals are used for the health care providers to keep themselves updated regarding the recent management techniques in poisoning cases. The country should also develop special ambulances that attend immediately when the poison helpline rings with anti-poisoning gear and first aid kits as traffic-related issues can cause a delay in the management to the victims which could be fatal.

High rates of intentional poisoning were observed among young adults residing predominantly in urban areas due to expanding stress in life, unemployment, changing lifestyles, financial hardship, life settlement issues thus suicide preventive measures such as peer support programs, training community and family members, crisis centres and helplines, identify adolescents and adults and refer them to mental health care centres should be initiated.

"What people never understand is that depression is is n't about the outside, it's about the inside". Depressive condition acts a slow poison and thus it is important to ensure appropriate psychiatric counselling to such patients to reduce the risk of the next episodes.

ABBREVIATIONS

GCS: Glasgow Coma Scale

DAMA: Discharge Against Medical Advice

DISCLOSURES

The authors declare no conflict of interest. All the authors declare that they had no financial, personal relations towards other organisations whose interest could have affected the content of the article in either positive or negative way.

AUTHORS CONTRIBUTIONS

Dr Sathvika and Dr Revathi wrote the primary draft of this paper, which was edited by Mrs. Lakshmi Prasanna Marise for essential content. Dr. Aruna C Ramesh helped with the review of the paper for improved quality. All the authors reviewed and provided comments on further iterations.

CONFLICT OF INTEREST

"The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper."

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