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Accuracy of BR Regression Equation In Haryana Population

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Abstract

Age estimation in children is not only important in clinically dentistry but also in forensic dentistry. The orthopantomograph samples of 25 healthy children (13 boys: 12 girls) aged between 5-15 years was selected and applied BR regression equation. I observed that underestimation of age in boys and overestimation in girls as compared to their chronological age.

Keywords

Forensic dentistry, BR regression equation.

Introduction

Tooth formation is widely used to assess maturity and predict age. In clinical dentistry, this information aids in diagnosis and treatment planning.[1] The continuous patterns of tooth development can be observed on a longitudinal series of radiographs and various mineralization stages.[2-6] A number of methods have been proposed to determine dental age,[7-9] but, the system developed by Demirijian has gained wide acceptance.[9]

During developmental stages particularly in root formation, a notable difference between sexes arises with females being advanced when compared with males.[10-11] Previously we proposed a regression equation for age determination from Open and closed apices in children [12] . It has been reported that teeth development is depend upon number of factors such as genetic factor, environmental factors, nutritional factors and geographical factors [4-7] .Hence the present study was planned to determine the accuracy of BR equation on Haryana Population for age estimation from open and closed apices.

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Material and Methods

The orthopantomographs sample of 35 healthy children (13 boys: 12 girls) aged between 5-15 years was selected. Panoramic radiographs that were unclear or that showed hypodentia, gross pathology and previous orthodontic treatment were excluded. The chronological age for each subject was calculated by subtracting the data of the radiograph from the date of birth.This was a retrospective cross-sectional study. Good quality digital panoramic radiographs taken for this study during the course of diagnosis and treatment.Orthopantomographs were digitized using a scanner (HP), and images were recorded computer files by computer aided drafting program (Adobe Photoshop 7). The seven left and right permanent mandibular teeth were recorded. The number of teeth with root development complete apical ends of the roots completely closed (N0) and open apices (S), was calculated and applied regression equation as following.[12] G variable is 1 for boys and 0 for girls.

$$Age = 7.083 + 0.493G + 0.931x3 - 0.854S + 0.693N0 - 0.185S\ N0 \quad \text{Equation (1)}$$

Results and conclusions

We observed that underestimation of age in boys and overestimation in girls as compared to their chronological age (Table 1) .It may be due to different in geographical ,genetic and environment factors. So this equation various from population to population, hence it should be required more study on different population.Chronological age, as recorded by registration of birth date, is referred to throughout an individual's life. This information is relevant in medical and dental practice for evaluating developmental progress, for educational purposes and in legal maters, particularly in application of criminal law.[9,10] Various studies have reported that morphological measurements can be reliably made in orthopentomographs provided that

some corrections are made to take into account the individual variability of tooth size and the differences in magnification of radiographs and angulations between x-ray beam and film.[12] The present regression equation I is derived for age estimation from children. This equation may be used as a diagnostic tool for age estimation in children, where in medico legal cases and clinical dentistry.

Table I: Different chronological and estimated age

Sr.No	Chronological age	Estimated age
1 (M)	4.5	3.8
2 (M)	6.8	5.7
3 (M)	8.7	7.6
4 (M)	8.9	8.2
5 (M)	11.2	10.9
6 (M)	6.7	5.6
7 (M)	7.8	6.7
8 (M)	12.7	11.6
9 (M)	15.3	13.2
10 (M)	13.2	12.7
11 (M)	10.6	9.8
12 (M)	7.8	6.9
13 (F)	8.3	8.6
14 (F)	11.9	12.3
15(F)	10.4	10.7
16 (F)	14.5	14.8
17 (F)	8.8	9.6
18 (F)	7.9	8.1
19 (F)	11.9	13.8
20 (F)	11.2	12.2
21 (F)	6.5	8.8
22 (F)	9.7	10.2
23 (F)	11.9	12.9
24 (F)	7.3	8.8
25 (F)	11.2	13.9

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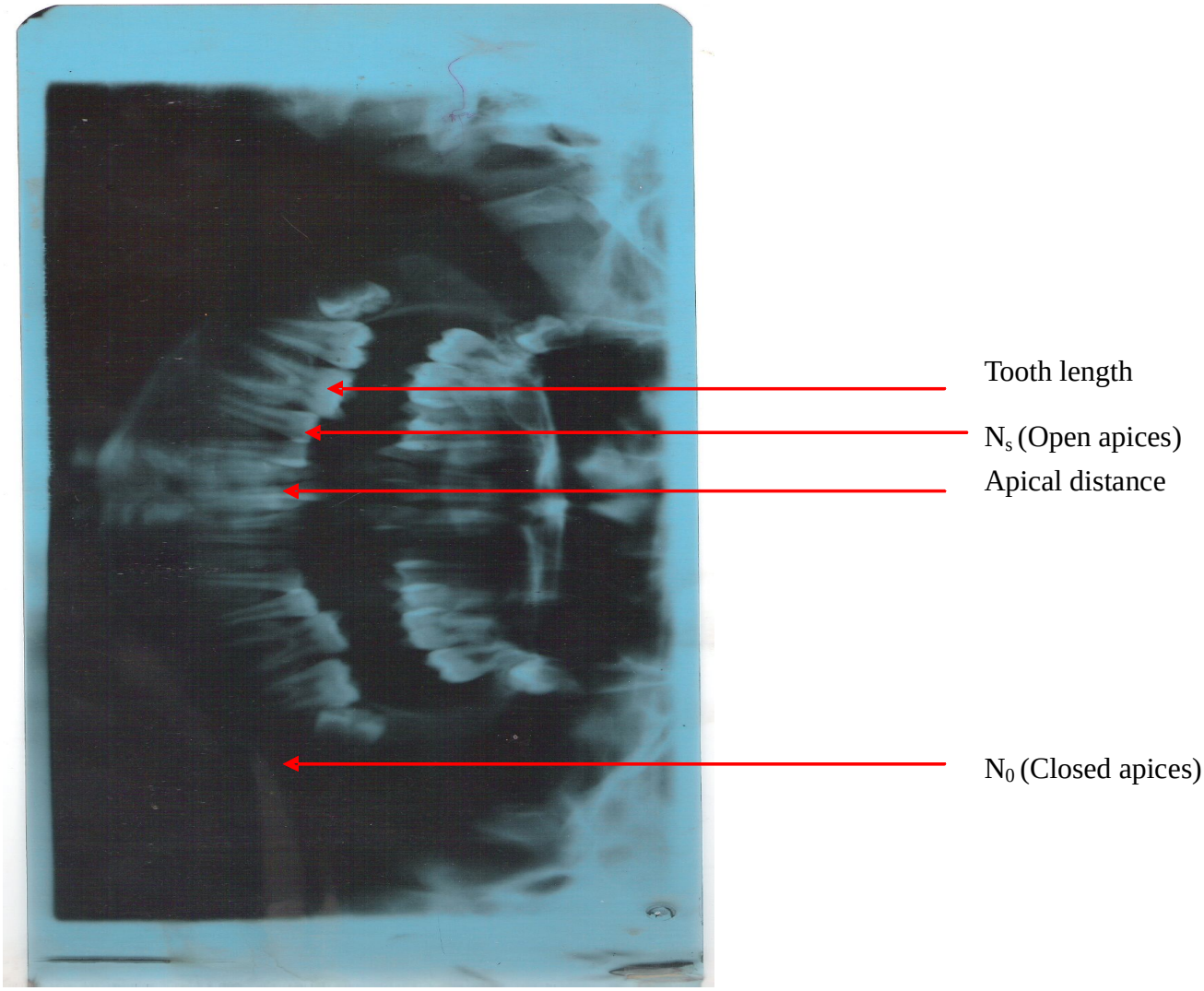
Fig. 1: Parameter of Study



Age Estimation from Eruption of Permanent Teeth in North Indian: An Issue for Forensic Odontology

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Abstract

The aim of this study was to present new data on the time and sequence of primary and permanent tooth emergence in large sample of north Indian and to compare the finding with those of earlier studies. The results were significantly different from earlier literature on the eruption pattern in primary. Tooth emergence was advanced in girls compared with boys ($p<0.001$). Moreover, there is slightly delayed eruption of in north Indian as compared to Iraq and US. The results of this research prove valuable to dentists as well as anthropologists for comparison.

Keywords

Anthrology, eruption, primary

Teeth in North Indian

An Issue for Forensic Odontology

Introduction

Up-to-date population specific standards on the time and sequence of emergence of the teeth represent an important resourance for general dental practitioners, dental anthropologist, forensic odontologist and dental axiliaries. Eruption of teeth is affected by climate, race, diet and geographical factors (Lunt and Law 1974, Baghdady and Ghose 1981). India is very big country, with different climates. Hence it is not correct to apply same data to whole of the country. Moreover, no recent study on eruption of teeth has been performed in north on India. The purpose of this study was to determine the mean ages and standard deviation of eruption times for primary dentition and permanent teeth in north Indian and to compare the eruption times with other studies.

Subjects and Methods

For permanent teeth:

A randomly selected sample of 929 normal clinically (M:F 460: 469) aged three to 17 years from out Deptt. Govt. Dental College, PGIMS, Rohtak, Haryana (India).

For primary teeth

Our sample consists of 942 normal clinically (M:F 465: 461) aged 3 months to 45 months selected from out Department, Govt. Dental College, PGIMS, Rohtak (Haryana) India.

The age of each child was ascertained from the birth certificate by calculating the chronological age from the date of births.

For purpose of this study, an erupted tooth was defined as any tooth with any part of its crown penetrating the gingiva and visible in oral cavity. The determination of tooth eruption was carried by Balwant Rai, one of the authors and Ajaypal using a month mirror in a room with good light source. The interact reliability was determined in randomized of the 110 children by the two examiners and the agreement was 95%.

The data was statistically analyzed by SPSS version 7.0 and student t-test was applied.

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Results

Table I: (mean + SD) eruption ages (in months) of maxillary teeth in north Indian (gender).

Tooth (FDI)	Boys (age in months) mean ± SD	Girls (in months) mean ± SD	Both genders (aged in months) mean ± SD
51,61	10.38 ± 1.32	11.09 ± 1.33	10.99 ± 1.3
52,62	12.43 ± 1.34	13.07 ± 1.43	12.94 ± 1.37
53,63	20.34 ± 1.43	21.04 ± 1.52	20.97 ± 1.43
54,64	15.32 ± 1.23	15.94 ± 1.54	15.47 ± 1.42
55,65	27.15 ± 1.37	27.37 ± 1.53	27.32 ± 1.41

$p<0.001$

Table II: (mean ± SD) eruption ages (in months) of mandibular teeth in north Indian (gender)

Tooth (FDI)	Boys (age in months) mean ± SD	Girls (age in months) mean ± SD	Both genders (aged in months) mean ± SD
71,81	9.42 ± 1.47	9.97 ± 1.42	9.62 ± 1.45
72,82	13.42 ± 1.43	14.62 ± 1.47	13.85 ± 1.44
73,83	20.21 ± 1.37	21.42 ± 1.58	20.92 ± 1.41
74,84	16.94 ± 1.29	16.47 ± 1.52	16.82 ± 1.34
75,85	26.97 ± 1.37	26.96 ± 1.53	26.95 ± 1.42

$p<0.001$

Table III: Comparison of mean eruption age (in months) of maxillary teeth in gender in north Indian population with others

Tooth	Sex	US (Lunt and Law, 1974)	Saudi (Al-Jasser and Bello, 2003)	Iraq (Baghdady and Ghose, 1981)	North India
51,61	M	9.36	11.19	10.70	10.38
	F	8.76	11.20	10.60	11.09
52,62	M	12.00	13.09	10.10	12.43
	F	11.76	13.31	11.40	13.07
53,63	M	21.00	21.14	18.80	20.34
	F	20.76	21.03	19.90	21.09
54,64	M	17.52	16.88	16.30	15.32
	F	16.32	16.90	16.40	15.94
55,65	M	30.96	28.16	26.00	27.15
	F	31.44	28.25	27.00	27.37

The median ages of emergence for all of the primary teeth in boys and girls are provided in Table I, II for both maxillary and mandibular there were no difference in the mean age of eruption of the teeth in right and left sides. There is a tendency for teeth to erupt earlier in boys in both maxilla and mandible as compared to girls (table I, II, $p<0.001$). The results of this study were compared to those similar studies involving varying social or countries (Table III, IV); they suggest a slightly delayed eruption as compared to Iraq and US, but earlier as compared to Saudi (Table III, IV).

Discussion and Conclusions

Teeth are very important indicators in medico-legal and dental anthropology as they help in identification and age estimation in the living as well as in the dead because they resist putrefaction and are constant in their appearance. We found a tendency for teeth to erupt earlier in boys for both jaws, although the differences was marginal (Table I, II $p<0.001$) as previous studies. (Falknes 1957, Nanda 1960) It has been observed that slightly delayed of primary teeth eruption in North Indian as compared to Iraq (Table III, IV). Several studies have considered influential factors such as nutrition, socio-economic status, climate, and premature extraction of deciduous teeth on the time and order of the emergence of teeth. (Lavelle 1975).

In the previous study pointed out the relative unimportance of environment influence in permanent dental emergence. (Friendlaender and Bailit 1969).

The data presented in this study provide new standards for primary and permanent tooth emergence derived from a sample of North Indian population. Generally median emergence times were delayed compared with Iraq and US. There are several possible reasons for those difference that may be related to either, or, both, methodological and biological issues. This paper would prove a useful basis of comparison for anthropologists as well as dentist for health care delivery.

Table IV: Comparison of mean eruption age (in months) of mandibular teeth in gender in north India population with others

Tooth (FDI)	Sex	US (Lunt and Law, 1974)	Saudi (Al-Jasser and Bello, 2003)	Iraq (Baghdady and Ghose, 1981)	North India
71,81	M	7.20	8.44	9.20	9.42
	F	7.68	8.49	8.40	9.62
72,82	M	13.08	14.44	14.00	13.42
	F	13.32	14.61	14.30	13.85
73,83	M	20.88	21.03	19.00	20.21
	F	20.52	21.10	20.30	20.92
74,84	M	16.56	17.17	16.90	16.94
	F	16.44	17.13	17.00	16.82
75,85	M	30.00	27.92	26.00	26.97
	F	29.52	27.97	25.10	26.95
31,41	6.6	6.4	6.9	6.4	
32,42	7.8	7.5	7.9	7.6	
33,43	11.0	10.1	11.3	10.8	
34,44	11.2	10.6	11.8	10.9	

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Doctor and Law

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Abstract

After the Consumer Protection Act. 1986, came into effect, a number of patients have filed cases against doctors. This article presents a summary of legal decisions related to medial negligence, what constitutes negligence in civil and criminal law and what is required prove it.

Public awareness of medical negligence in India is growing. Hospital managements are increasingly facing complaints regarding the facilities, standards of professional competence and the appropriateness of their therapeutic and diagnostic methods. After the Consumer Protection Act. 1986, has come into force some patients have filed legal cases against doctors, have established that the doctors were negligent in their medical service and have claimed and received compensation. As a result, a number of legal decisions have been made on what constitutes negligence and what is required to prove it.

Civil law and negligence

Negligence is the breach of a legal duty to care. It means carelessness in a matter in which the law mandates carefulness. A breach of this duty gives a patient the right to initiate action against negligence.

Persons who offer medical advice and treatment implicitly state that they have the skill and knowledge to do so, that they have the skill to decide whether to take a case, to decide the treatment and to administer that treatment. This is known as an "implied undertaking" on the part of a medical professional. In the case of the State of Haryana Vs Smt. Santra, the Supreme Court held that every doctor "has a duty to act with a reasonable degree of care and skill".[1]

Doctors in India may be held liable for their services individually or vicariously unless they come within the exceptions specified in the case of Indian Medical Assoication Vs V P Santha.[2] Doctors are not liable for their services individually or vicariously if they do not charge fees. Thus free treatment at a non-government hospital, government hospital, health center, dispensary or nursing home would not be considered a "service" as defined in Section 2 (1) (0) of the Consumer Protection Act, 1986.

However, no human being is perfect and even the most renowned specialist could make a mistake in detecting or diagnosing the true nature of a disease. A doctor can be held liable for negligence only if one can prove that she/ he is guilty of a failure that no doctor with ordinary skills would be quality of if acting with reasonable care.[3] An error of judgement constitutes negligence only if a reasonably competent professional with the standard skills that the defendant professes to have, and acting with ordinary care, would not have made the same error.[4]

In a key decision on this matter in the case of Dr. Laxman Balkrishna Joshi Vs Dr. Trimbak Bapu Godbole, the Supreme Court held that if a doctor has adopted a practice that is considered "proper" by a reasonable body of medical professionals who are skilled in that particular field, he or she will not be held negligent only because something went wrong.

Doctors must exercise an ordinary degree of skill.[5] However, they cannot give a warranty of the perfection of their skill or a guarantee of cure. If the doctor has adopted the right course of treatment, if she / he is skilled and has worked with a method and manner best suited to the patient, she / he cannot be blamed for negligence if the patient is not totally cured.[6]

Certain conditions must be satisfied before

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liability can be considered. The person who is accused must have committed an act of omission or commission, that act must have been in breach of the person's duty; and this must have caused harm to the inured person. The complainant must prove the allegation against the doctor by citing the best evidence available in medical science and by presenting expert opinion.[7]

In some situations the complainant can invoke the principle of res ispa loquiture or "the thing speaks for itself". In certain circumstances no proof of negligence is required beyond the accident itself. The National Consumer Disputes Redressal Commission applied this principle in Dr. Janak Kantimathi Nathan Vs Murlidhar Eknath Masane.[8]

The principle of res ipsa loquiture comes into operation only when there is proof that the occurrence was unexpected, that the accident could not have happened without negligence and lapses on the part of the doctor, and that the circumstances conclusively show that the doctor and not any other person was negligent.

Criminal negligence

Section 304A of the Indian Penal Code of 1860 states that whoever causes the death of person by a rash or negligent act not amounting to culpable homicide shall be punished with imprisonment for a term of two years, or with a fine, or with both.

In the Santra Case, the Supreme Court has pointed out that liability in civil law is based upon the amount of damages incurred; in criminal law, the amount and degree of negligence is a factor in determining liability. However, certain elements must be established to determine criminal liability in any particular case, the motive offence, the magnitude of the offence and the character of the offender.

In Poonam Verma Vs Ashwin Patel the Supreme Court distinguished between negligence, rashness, and racklessness.[9] A negligent person is one who inadvertently commits an act of omission and violates a positive duty. A person who is rash knows the consequences but foolishly thinks that they will not occur a result of her/his act. A reckless person knows the consequences but does not care whether or not they result from her/his act. Any conduct falling short of recklessness and deliberate wrongdoing should not be the subject of criminal liability.

Thus a doctor cannot he held criminally responsible for a patient's death unless it is shown that she/he was negligent or incompetent, with such disregard for the life and safety of his patient that it amounted to a crime against the State.[10]

Section 80 and 88 of the Indian Penal Code contain defences for doctors accused of criminal liability. Under Section 80 (accident in doing a lawful act) nothing is an offence that is done by accident or misfortune and without any criminal intention or knowledge in the doing of a lawful act in a lawful manner by lawful means and with proper care and caution. According to Section 88, a person cannot be accused of an offence if she/he performs an act in good faith for the other's benefit, does not intend to cause harm even if there is a risk and the patient has explicitly or implicitly given consent.

Burden of Proof and Chances of Error

The burden of proof of negligence, carelessness, or insufficiency generally lies with the complainant. The law requires a higher standard of evidence than otherwise, to support an allegation of negligence against doctor. In cases of medical negligence the patient must establish her/his claim against the doctor.

In Calcutta Medical Research Institute Vs Mimalesh Chatterjee it was held that the onus of proving negligence and the resultant deficiency in service was clearly on the complainant.[11] In Kanhaiya Kumar Singh Vs Park Medicare and Research Centre, it was held that negligence has to be established and cannot be presumed.[12]

Even after adopting all medical procedures as prescribed, a qualified doctor may commit an error. The National Consumer Disputes Redressal Commission and the Supreme Court have held, in several decisions, that a doctor is not liable for negligence or medical deficiency if some wrong is caused in her/his treatment or in her/his diagnosis if she / he has acted in accordance with the practice accepted as proper by a reasonable body of medical professional

skilled in that particular art, though the result may be wrong. In various kinds of medical and surgical treatment, the likelihood of an accident leading to death cannot be ruled out. It is implied that a patient willingly takes such a risk as part of the doctor-patient relationship and the attendant mutual trust.

Recent Supreme Court Rulings

Before the case of Jacob Mathaw Vs State of Punjab, the Supreme Court of India delivered two different opinions on doctor's liability. In Mohanan Vs Prabha G Nair and another,[13] it ruled that a doctor's negligence could be ascertained only by scanning the material and expert evidence that might be presented during a trial. In Suresh Gupta's case in August 2004 the standard of negligence that had to be proved to fix a doctor's or surgeons criminal liability was set at "gross negligence" or "racklessness".

In Suresh Gupta's case the Supreme Court distinguished between an error or judgement and culpable negligence. It held that criminal prosecution of doctors without adequate medical opinion pointing to their guild would do great disservice to the community. A doctor cannot be tried for culpable or criminal negligence in all cases of medical mishaps or misfortunes.

A doctor may be liable in a civil case for negligence but mere carelessness or want of due attention and skill cannot be described as so reckless or grossly negligent as to make her / him criminally liable. The courts held that this distinction was necessary so that the hazards of medical professionals being exposed to civil liability may not unreasonably extend to criminal liability and expose them to the risk of imprisonment for alleged criminal negligence.

Hence the complaint against the doctor must show negligence or rashness of such a degree as to indicate a mental state that can be described as totally apathetic towards the patient. Such gross negligence alone is punishable.

On September 9, 2004, Justices Arijit Pasayat and CK Thakker referred the question of medical negligence to a large Bench of the Supreme Court. They observed that words such as "gross," "rackless," "Competence", and "indifference" did not occur anywhere in the definition of "negligence" under Section 304A of the Indian Penal Code and hence they could not agree with the judgment delivered in the case of Dr. Suresh Gupta.

The issue was decided in the Supreme Court in the case of Jacob Mathew Vs State of Punjab.[14] The court directed the central government to frame guidelines to save doctors from unnecessary harassment and undue pressure in performing their duties. It ruled that unit the government framed such guidelines, the following guidelines would prevail:

A private complaint of rashness or negligence against a doctor may not be entertained without prima facie evidence in the form of a credible opinion of another competent doctor supporting the charge. In addition, the investigation officer should give an independent opinion, preferably of a government doctor. Finally, a doctor may be arrested only if the investigating officer believes that she / he would not be available for prosecution unless arrested.

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6. Criminal Appeal Nos 144-145 of 2004.

Drowning Cases in Kasturba Hospital, M.G.I.M.S Sewagram, Wardha, Maharashtra

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Abstract

In this retrospective study, total 27 victims of drowning asphyxial deaths cases were studied during the period from January 2003 to December 2006, at Kasturba Hospital of MGIMS, Sevagram. All cases were brought dead from spot for postmortem examination. The incidence was much more common in the males at the age group of 20-29 years and 50 years and above. Accidental drowning was the more common and common place as well. Maximum cases of suicidal drowning was with the history of some kind of mental illness or some chronic disease, presence of mud, sand etc. in lower respiratory tract was a very important sign of drowning.

Key words

Drowning, Suicide, Accidental death.

Present Designation-

Introduction

Drowning death is one of the most important unnatural deaths encountered by autopsy surgeons. The incidence of drowning death are different from place to place, could be due to geographical influences. **World War II** stimulated research on drowning because of the risk of cold exposure for a larger number of seamen and airmen's. View of that time was that victim died from a lack of oxygen when plunged into water.

Near about 1,50,000 persons die from drowning each year around the world.

In 1997, The National Center for Health Statistics found drowning, second only to motor vehicle collisions (MVCs) as the most common cause of injury and death in children aged 1 month to 14 years.

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Defination

Is a form of asphyxia in which access of air to the lungs is prevented by submersion of body in water or other fluid medium. [1]

Classification:- [2]

1. Typical or wet or primary drowning
2. A typical or Dry drowning
   a) Immersion syndrome
   b) Submersion of Unconsciousness
   c) Near drowning (Secondary shock syndrome)

Typical or wet or primary drowning-

* Obstruction of air passage and lungs by inhalation of fluid

* Typical signs of drowning found in at autopsy

*** Two types**

A) Fresh water drowning

B) Salt water drowning

A) Fresh water drowning:

Large quantity of water → crosses the alveolar membrane into circulation → Hypervolaemia of red cellsàhemolysis → liberation of potassium → anoxia, hypervolemia, potassium excess and sodium deficit → ventricular fibrillation → Death (4-5 minute).

B) Salt water drowning:

Marked hyper tonicity of inhaled water → loss of fluid from circulation in to lungs → pulmonary edema with hypovolaemia → circulatory shock

→ cardiac a systole → Death (8-12 minutes).

* **A typical Drowning**

A) **Dry Drowning**

As the water enters nasopharynx or larynx → Laryngeal spasm → Asphyxia →Death .

B) **Immersion Syndrome (Vaso-Vagal inhibition)**

* Sudden impact with cold water
* In experience person → Duck diving
* Horizontal entry → Impact on epigastrium

C) **Submersion of Unconsciousness-**

* Epileptic ,Hypertensive, Heart Disease, Drunken

D) **Near Drowning-**

Complication →Hypoxic → Encephalopathy → Fibrosing alveolitis.

External Appearance

Clothes are wet, soiled by mud, sand or weeds.

- Skin is cold, clammy and pale due to contraction of blood vessels.
- Face may or may not be cyanotic.
- Eyes are half opened or closed.
- Conjunctiva congested, pupils dilated.
- Postmortem lividity absent if body is in constant motion but if present then on head, neck and front of the chest, mainly on dependent parts.
- Due to muscular exhaustion rigor mortis develops.

* **Absolute signs are-**
* a) fine froth at the nose and mouth
* b) Presence of weeds, mud in the tightly clenched hand
* c) Cutis anserina or goose skin
* d) Hands and feet of the washer women.

Internal appearance

a) Changes in the respiratory tract-

Ballooning of the lung or Emphysema aquosam.

b) Biochemical changes in the blood-

I) Gettler's Test-

c) Presence and character of water in stomach & intestine

d) Presence of diatoms in tissues

e) Evidences indicative of death due to drowning-

I) Hemorrhages in the middle ear.

ii) Hemorrhage in the temporal bone or Mastoid bones

Material and Methods

This study was carried out at Kasturba Hospital of M.G.I.M.S; Sevagram, Wardha during the period from January 2003 to December 2006. The material for this study compromised of all type of drowning cases admitted at Kasturba Hospital Sewagram and directly brought dead from the spot at mortuary for postmortem examination during this period, in the Dept. of Forensic Medicine and Toxicology. Total 27 suspected drowning cases were brought for the postmortem examination at Kasturba Hospital Sewagram. The history about name, age, sex, address, manner, economic status and others are taken from the relatives and police who brought the dead body for the postmortem examination.

Each case was followed from various epidemiological factors like age, sex, occupation, religion, education; socio-economic status etc. and the medico-legal aspects were gathered from various sources and postmortem features of cases were collected from the autopsy examination.

Observation

Total 27 victims of drowning were brought dead from the spot for postmortem examination. All finding carefully observed and tabulated for better understanding.

Table No: - 1 showing year-wise incidence of drowning cases

Year	Cases
2003	13
2004	8
2005	3
2006	3
Total	27

Out of the cases, more cases were reported from year 2003 and least number of cases was reported from year 2005-06 respectively.

Table No: - 2 showing sex- wise incidence of drowning cases.

Sex	No. of cases	Percentage
Male	18	66.67
Female	09	33.33
Total	27	100.00

Out of 27 cases of drowning, 18(66.67%) cases were male and 9 (33.33%) cases were females, indicating the male predominance in drowning cases.

Table No: - 3 showing age and sex- wise distribution of drowning cases.

Age group	Male (%)	Female (%)	Total (%)	M:F
0-9 yrs.	2(11.1)	0(0)	2(0.07)	-
10-19 yrs.	3(16.6)	1(11.1)	3(0.11)	-
20-29 yrs.	6(33.3)	2(22.2)	10(37.03)	3:1
30-39 yrs.	3(16.6)	1(11.1)	4(14.81)	3:1
40-49 yrs.	2(11.1)	1(11.1)	2(7.40)	2:1
>50and above	4(22.2)	4(44.4)	8(22.2)	1:1
Total	18(100)	9(100)	27(100)	

Out of 27 victims of drowning, maximum cases were observed in the age group of 20-29 years and 50 years and above age group, comprising 10 (37.03%) cases each.

Among 18 males victims, maximum observed in the age group of 20-29 years comprising 6(33.3%), followed by 50 and above years having 4(22.2%) cases.

Among 9 female victims, maximum 4(44.4%) cases were in the age group of 50 years and above, followed by 2(22.2%) cases in 20-29 years.

Table No: - 4 showing rural/urban incidence of drowning cases

Rural/urban	Male	Female (%)	Total
Rural	15(83.33)	6(66.67)	21(77.78)
Urban/semi urban	3(16.67)	3(33.3)	6(22.22)
Total	18	9	27

Maximum drowning cases were from rural areas, comprising 21(77.78%) cases, whereas 6 cases were from urban/semi urban areas. Among, males, 15 (83.33%) cases were from rural areas, 3(16.67%) cases were from urban areas. Among females, 6(66.67%) cases were from rural and 3 (33.3%) cases from urban areas.

Table No: - 5 showing economic status of drowning cases

Economic status	No. of cases	Percentage
Low (<500Rs.)	20	74.07%
Middle(500-1500Rs.)	7	25.93%
Higher (>1500Rs.)	-	-
Total	27	100.00%

Out of 27 victims of drowning, maximum cases were in the lower socio-economic groups, comprising 20 (74.07%) and 7 (25.93%) cases were in the middle socio-economic status. No victim from the higher socio-economic status.

Table No: - 6 showing manner of drowning cases.

Manner	Male	Female	Total
Accidental	12(66.67)	3(33.33)	15(55.56%)
Suicidal	6(33.33)	6(66.67)	12(44.44%)
Homicidal	-	-	-
Total	18(100)	9(100)	27(100%)

Among males, 12(66.67%) cases were accidental and 6 (33.33%) cases were from suicidal drowning. Among females, 3(33.33%) cases were accidental and 6(66.67%) cases were from suicidal drowning.

Table No:- 7 showing the content of respiratory tract in drowning cases.

Features	No. of cases	Percentage
Froth from nose only	4	(14.82)
Froth from nose and mouth	5	(18.51)
Mud, sand etc. in lower respiratory tract	18	(66.67)

Among 27 cases of drowning, mud, sand etc. were present in the lower respiratory tract in 18(66.67%) cases, froth was found in the nose in the nose & mouth in 5(18.51%) cases and only in the nose in 4(14.82%) cases.

Discussion

Total 27 victims of drowning cases were studied during the period of study; all cases were brought dead from the spot for the postmortem examination, but this finding slightly different from study of Bennet A.T.[3] [3]from sought Carolina, observed that suicidal death drowning consist of 3.24% cases. Momanchand A. and others[4] from Imphal also reported that drowning was the 34.50% cases.

The present study, observed that the incidence is much more common in males than females, 66.67% & 33.33% respectively. Similar findings were observed in study of Momanchand A. and others [4] from Imphal and Avis A.P. [5] from Canada. This could be due to more activeness of male's society and less carelessness in females.

In this study maximum incidence was seen in the age group of 20-29 years and 50 years and above age groups, comprising 37.03% cases each. This finding is slightly consistent with the finding of Avis A.P.[5] from Canada who reported that 51-60 years age group people were the common victim of suicidal drowning. This finding slightly different from the finding of Momanchand A. and others [4] from Imphal, in which 11-30 years was the commonest age group of drowning cases.

In the present study, out of all drowning cases, accident drowning was more, in 55.56% cases followed by suicidal 44.44% cases. Accidental drowning was more common because in this region economy is mainly depends upon the agricultural products and their irrigation mainly done by water from the well, canals, ponds, rivers, These are not safely guarded places, so accidental drowning is more common due to fall into the water.

In this study, 66.67% cases of drowning, shows mud, sand etc. were present in lower respiratory tract; this finding is similar to finding of Momanchand A. and others [4] from Imphal.

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Study of Medical Students' Attitudes towards Physician-Assisted Suicide in Mauritius

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Abstract

Within the context of the debate over "the right to die", some basic notions need to be clarified to discuss the acceptability of physician assisted suicide (PAS). Currently, PSA is not legal in Mauritius. The aim of this study was to assess the medical student attitudes towards PAS and compare the results of surveys among second, third, fourth and fifth year students. The study was conducted on 266 medical students at SSR Medical College, Mauritius by means of an anonymous questionnaire that comprised of 13 questions concerning personal perceptions, knowledge, attitudes and factors influencing decision making about PAS. Majority of students were in favour of PAS. The 'patient's prospects for improvement' was considered as most important factor for decision making regarding PAS. Approximately half of the students became in favour of PAS over the course of medical school. This change in behaviour was mainly noted in the senior medical students that perhaps because of clinical exposure.

Key Words

Physician-assisted suicide, Attitudes, Medical Students, Ethics, Euthanasia.

Introduction

Physician-Assisted Suicide (PAS) means the voluntary termination of one's own life by administration of a lethal substance with the direct or indirect assistance of a physician, making last days of the patients as comfortable as possible **[1]**. It occurs when a physician provides either equipment or medication, or informs the patient of the most efficacious use of already available means, for the purpose of assisting the patient to end his or her own life **[2]** .Now a days, the issues on PAS have become very vital world wide due to recent legalizations on PAS and its current practice in the Netherlands in April 2002 and in Belgium in May 2002. Earlier, Oregon was the first American state to legalize PAS.

Physician-Assisted Suicide is a highly debated issue and continues to generate significant controversy. Many studies **[3-20]** have been conducted to examine the attitudes and experiences of health care professionals and medical students towards PAS and euthanasia around the globe. Some studies have been attempted to observe changing attitudes towards PAS in medial students as per duration of clinical training **[5, 16].** Survey of medical students is instructive because it is likely that identities and attitudes as physicians are influenced by early experiences**[21]**. In most of the countries including Mauritius, aiding in a suicide is a crime, while suicide or attempting suicide is not illegal. This study has been conducted to understand the attitudes and opinions of second, third, fourth and fifth year medical students regarding PAS and to compare the results of our survey with other published studies.

Methodology

A cross-sectional survey was administered to 266 medical students of multicultural background at SSR Medical College, Mauritius to explore their attitudes towards PAS. Attitudes were assessed by giving 13-item questionnaire **[5] (Table 1)** to students at the beginning of a lecture and collected at the end of session. Attitudes were measured by using a four point Likert scale (Strongly Agree-1, Agree-

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2, Disagree- 3 and Strongly Agree- 4). The definition of PAS was provided at the top of each survey format. The students were instructed to give their free opinion anonymously, preserving confidentiality. Participation of students was optional. This survey was conducted in May 2007.

The results of the survey were tabulated and analyzed statistically. A P-value less than 0.05 was considered as statistically significant. Comparisons were also made on the basis of age and sex. A one-way ANOVA was carried out to determine whether there was any significant difference in the response pattern among the students of different years. Independent T-test was carried out to determine gender difference.

Results

Demographic profile: The study was conducted to a total of 266 students (51% male and 49% female): 70 second year students, 90 third year students, 48 fourth year students and 58 fifth year students. Majority of students were less than 24 years of age (97%). The response rate was hundred percent. **(Table 2)**

Factors Influencing Decision Making About PAS: The students were assessed on the bases of 8 factors influencing decision making regarding PAS. Participant considered most the factors surveyed to be important. 'Patient's prospect for improvement' was considered as most important factor followed by 'Patients' understanding of management option' and 'Obtaining more than one medical opinion'. **(Table 3)**

A one-way ANOVA was carried out to determine whether there was any significant difference in the response pattern among the classes (i.e. students of different years). The results are summarized in the **table 4**. It can be noted that difference in responses arises for two questions namely: age of patient (P= 0.05) and patients' understanding of medical management options (P < 0.001). A post-hoc multiple comparison test reveals the following:

a. **Age of patient:** There was a significant difference between 2nd year and 4th year students.

b. **Patients' understanding of medical management options:** A significant difference was observed between 2nd and 4th year students and 2nd and 5th year students but no difference between 4th and 5th year students. **(Figure 1)**

c. **Option in favor of PAS:** Significant difference between 2nd and 4th year students.

Attitudes towards PAS: Approximately 60% students entered medical college with a clearly defined opinion on PAS. As a doctor, 54.5% students were willing to participate in PAS (P = n.s.) and as a patient, 68.5% respondents had opted PAS to be an option (P < 0.01). The opinions of most students (41%) towards PAS did not change over the course of medical school. About 48% students (126 out of 266) became in favour of PAS. **(Figure 2)**

Most of students (51%) welcomed the legislation of PAS and 33% students felt neutral about it. Only 16% students were in opposition to the legislation of PAS. **(Figure 3)**

Discussion: This study was designed to understand medical students' views towards PAS and explore differences related to gender and year of study. Medline search revealed that there has been significant increase in published literature and public interest regarding PAS related issues during last 10 years. Majority of the students entered medical school with a clearly defined opinion on PAS. About two third students would want PAS to be an option as a patient, but unwilling to participate in the process as physician. Approximately half of the students became in favour of PAS over the course of medical school. This change in behavior was mainly noted in the senior medical students that perhaps because of much clinical exposure. It shows the concept of PAS acceptability is directly proportional to an individual's amount of clinical experience. The students considered almost all factors examined in the survey to be important in making decision regarding PAS. 'Patient's prospect for improvement' was considered as a most important factor. A significant difference was observed for the factor 'patients understanding of medical management options' between 2nd year and senior medical students. T-test carried out on all 13 questions revealed no significant difference (P> 0.05) in opinion between male

and female students.

The findings of the present study support prior researches **[3,4,5]** showing that majority of students support the legalization of PAS. The studies conducted on medical students by **Adchalingam et al [6] and Warner et al [21]** showed medical students' opposition for PAS legalization. Limitations of this study are potential response bias and observational nature of the study. Despite of its limitations, the study provides significant results into the medical students' attitudes at different years of study periods and factors which help them in decision making regarding PAS. Although the results found in this study coincide with other similar studies, further studies are required to assess the attitudes of other medical professional especially nurses who had everyday contact and experiences with these terminally ill patients.

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Table 1: Survey Protocol[5]

Study of Medical Student Attitudes towards Physician-Assisted Suicide

Physician-Assisted Suicide means the voluntary termination of one's own life by administration of a lethal substance with the direct or indirect assistance of a physician, making last days of the patients as comfortable as possible.

Age:……. Sex:…….

For the following statements (1-3), kindly encircle your agreement level of each:

		Strongly Agree	Agree	Disagree	Strongly Disagree
1.	I entered the medical college with clearly defined opinion on physician assisted suicide.	1	2	3	4
2.	As a doctor, I would be willing to aid in physician assisted suicide.	1	2	3	4
3.	As a patient, I would want physician assisted suicide to be one of my options.	1	2	3	4

For the following statements (4-11) concerning decisions about physician assisted suicide, indicate your level of agreement of each:

		Strongly Agree	Agree	Disagree	Strongly Disagree
4.	The age of the patient is important.	1	2	3	4
5.	The persistence of the patient's request is important.	1	2	3	4
6.	Obtaining more than one medical opinion is important.	1	2	3	4
7.	A clear understanding by the patient of medical management options is important.	1	2	3	4
8.	The patient's prospects for improvement are important.	1	2	3	4
9.	Obeying the law is important.	1	2	3	4
10.	Respecting patient autonomy is important.	1	2	3	4
11.	Alleviating suffering is important.	1	2	3	4

Kindly complete each of the following by encircling the one phrase that best represents your opinion:

12. Over the course of medical college, I have:
    a. Become much more in favor of physician assisted suicide.
    b. Become somewhat more in favor of physician assisted suicide.
    c. Not changed my opinion towards physician assisted suicide.
    d. Become somewhat more opposed to physician assisted suicide.
    e. Become much more opposed to physician assisted suicide.

13. If physician assisted suicide was legalized I would:
    a. Strongly welcome the legislation.
    b. Welcome the legislation.
    c. Have neutral feeling towards the legislation.
    d. Be opposed to the legislation.
    e. Be strongly opposed to the legislation.

Thank you for your participation.

Table 2: Demographics of the students surveyed

	2nd Year Students	3rd Year Students	4th Year Students	5th Year Students	Total
Number	70	90	48	58	266
Male	47 (67%)	34 (38%)	17 (35%)	37 (64%)	135 (51%)
Female	23 (33%)	56 (62%)	31 (65%)	21 (36%)	131 (49%)
Age 19-21 yrs	69 (99%)	77 (86%)	26 (54%)	2 (3%)	174 (65%)
Age 22-24 yrs	1 (1%)	13 (14%)	21 (44%)	50 (86%)	85 (32%)
Age 25-27 yrs	-	-	-	4 (7%)	4 (2%)
Age 28+	-	-	1 (2%)	2 (3%)	3 (1%)

Table 3: Factors influencing Decision Making about PAS

Factors	Students considering factor to be important					P-value (all)
	2nd Year	3rd Year	4th Year	5th Year	All	
1. Age of patient	54 (77.1%)	77 (85.6%)	43 (89.6%)	51 (87.9%)	225 (84.6%)	<0.001
2. Persistence of patient's request	63 (90.0%)	75 (83.3%)	39 (81.3%)	46 (79.3%)	223 (83.8%)	<0.001
3. Obtaining more than one medical opinion	69 (98.6%)	86 (95.6%)	46 (95.8%)	57 (98.3%)	258 (97.0%)	<0.001
4. Patients' understanding of management options	65 (92.9%)	90 (100%)	48 (100%)	57 (98.3%)	260 (97.7%)	<0.001
5. Patient's prospect for improvement	68 (97.1%)	90 (100%)	48 (100%)	56 (96.6%)	262 (98.5%)	<0.001
6. Obeying the law	66 (94.3%)	82 (91.1%)	46 (95.8%)	57 (98.3%)	251 (94.4%)	<0.001
7. Respecting patient's autonomy	69 (98.6%)	81 (90.0%)	46 (95.8%)	53 (91.4%)	249 (93.6%)	<0.001
8. Alleviating suffering	68 (97.1%)	84 (93.3%)	44 (91.7%)	57 (98.3%)	253 (95.1%)	<0.001

Note: For the analysis of the factors below, results of "strongly agree" and "agree" have been merged as those "considering factor to be important".

Table 4: Statistical Analysis by ANOVA

Factors	df	F	Sig.
1. Age of patient	(3, 262)	2.601	.053*
2. Persistence of patient's request	,,	.477	.699
3. Obtaining more than one medical opinion	‘’	.508	.677
4. Patients’ understanding of medical management options	‘’	5.818	.001***
5. Patient's prospect for improvement	‘’	1.670	.174
6. Obeying the law	‘’	1.703	.167
7. Respecting patient's autonomy	‘’	.823	.482
8. Alleviating suffering	‘’	.540	.655
9. Option in favor of PAS	‘’	2.989	0.032*
10. Legalization of PAS	‘’	0.278	0.841

Figure 1: Difference in response to the factor- Patients’ understanding by the patient of medical management options

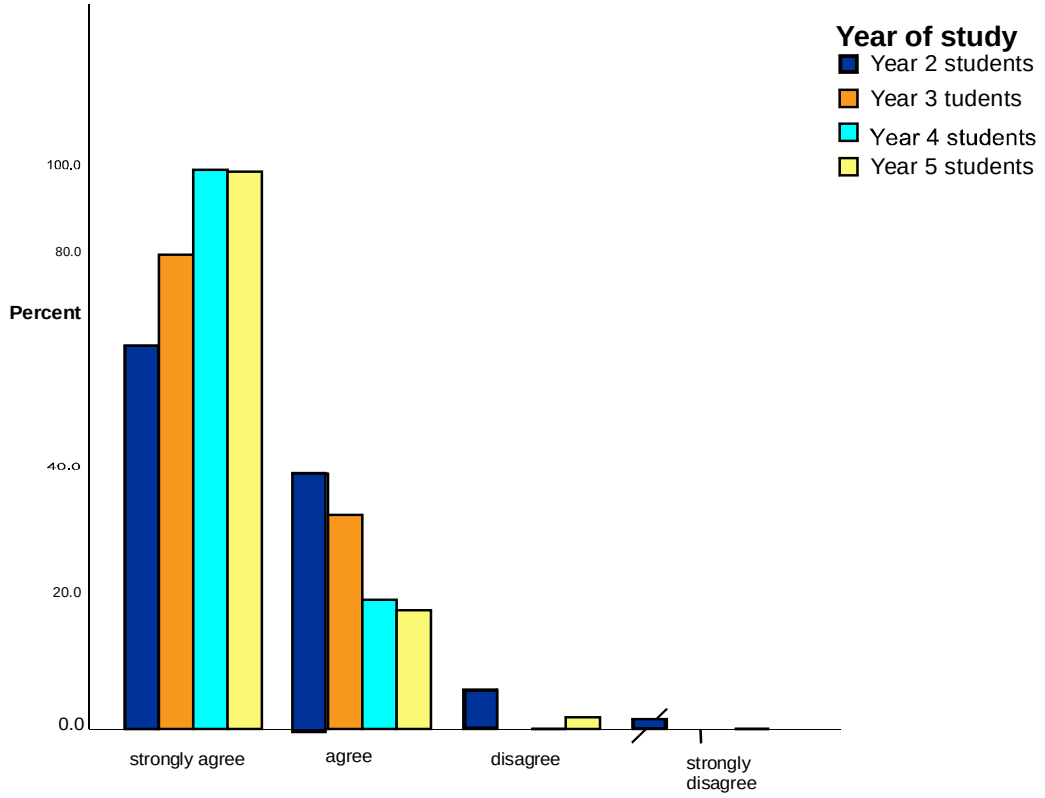


Figure 2: Opinion towards PAS

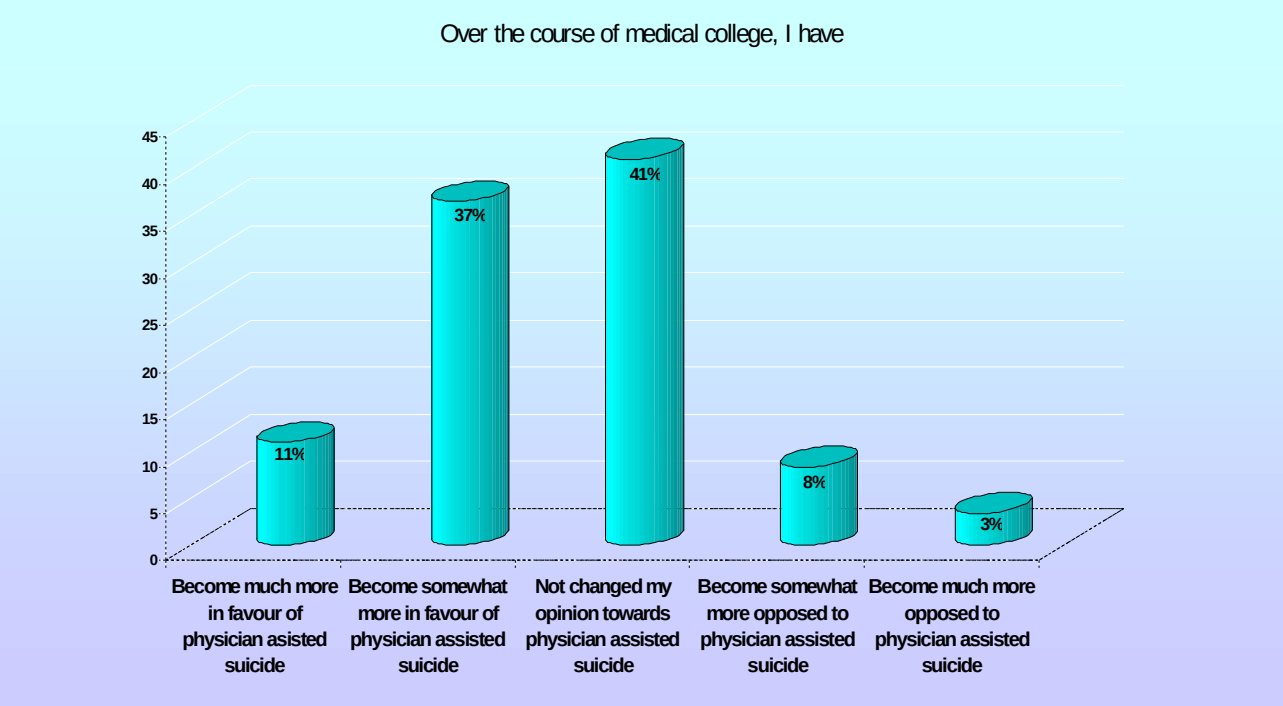
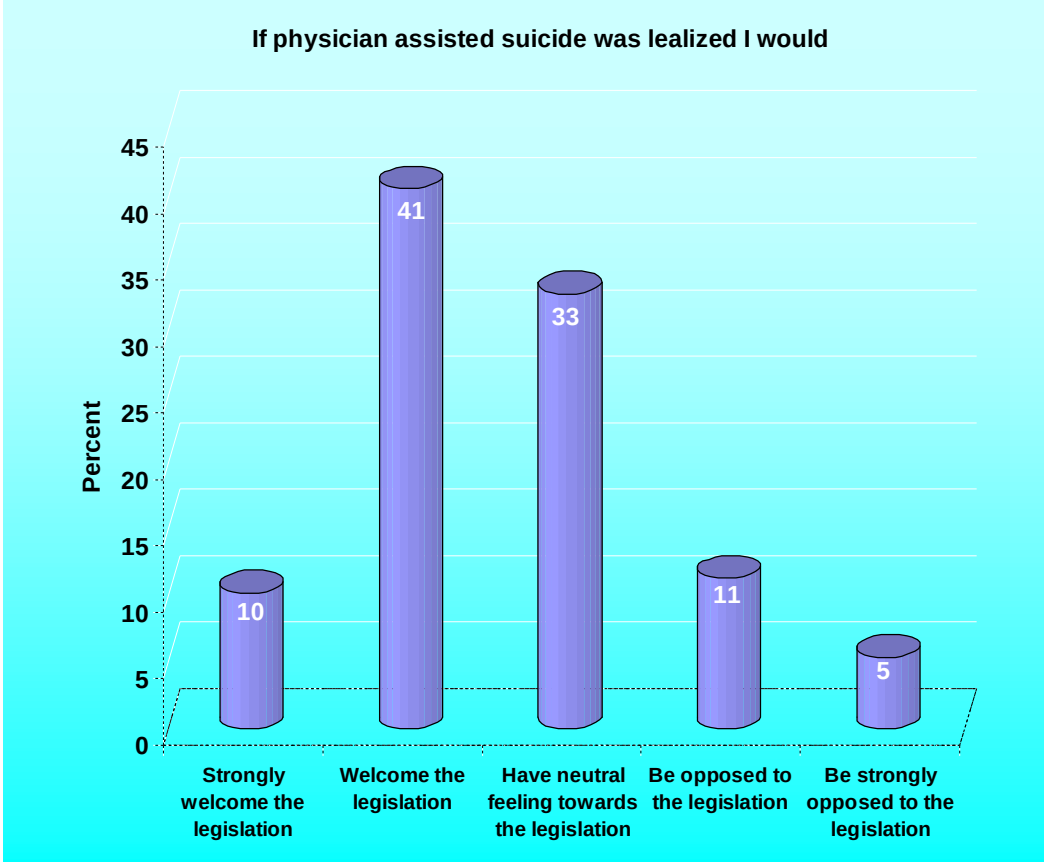


Figure 3: Attitudes towards Legislation



Conference Calendar

SAFCON 2008 will be held from October 10-12, 2008 By Amity Institute of Behavioural (Health) & Allied Sciences, and Amity University, All India Institute of Medical Sciences (Ministry of Health, Government of India) at A M I T Y U N I V E R S I T Y, Amity University Campus, Sector 125, Noida 201303, Expressway, Gautam Budh Nagar, (Uttar Pradesh) India, Contact http://www.amity.edu/aibhas/safcon/default.htm

The ENFSI Annual Meeting 2008 will be held at the Hotel "Villa Maria Regina" from Tuesday afternoon, May 13, 2008 (Get together in the evening) till Friday, May 16 (in the lunch time), 2008 in Rome - Italy. Contact: http://www.enfsimembers.eu/help_login.php

The Seventh International Conference on Forensic Inference and Statistics (ICFIS 08) will be held on the Lausanne University Campus. Taking advantage of the forensic science facilities, there will be three introductory workshops on the 20th of August, on respectively forensic DNA analysis, fingerprint identification and Bayesian networks in forensic science. Contact: http://www.unil.ch/icfis.

Forensic IT Working Group meeting will be organized in Madrid, from 1-3 October 2008. The meeting will range from workshops in digital evidence, media analysis, skimming, car electronics, mobile phone analysis, to proficiency testing and collaboration proposals in European projects. Contact: z.geradts@nfi.minjus.nl or crim-dei@guardiacivil.es.

The "1st International Eurasian Congress of Forensic Sciences" will be held October 8th, 2008 through October 11th, 2008 at the Harbiye Military Museum in Istanbul. Istanbul is a metropole connecting two continents, Asia and Europe, which are divided by the Bosphorus, by two bridges. Contact: http://www.adlitip2008.com/eng/index.asp