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RESEARCH ARTICLE

A CROSS SECTIONAL STUDY OF KNOWLEDGE, ATTITUDE AND PRACTICE OF MEDICAL STUDENTS ABOUT ORGAN DONATION

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ABSTRACT

Background: In 1912 Transplant pioneer Alexis Carrell received the Nobel Prize for his work in the field. The French surgeon had developed methods for connecting blood vessels and conducted successful kidney transplants on dogs. Ukrainian doctor Yu Yu Voronoy transplanted the first human kidney, using an organ from a deceased donor. The recipient died shortly thereafter as a result of rejection (Bilgel *et al.*, 2006). In 1982 on December 2, Barney Clark received the first artificial heart; he survived for 112 days (Taimur Saleem *et al.*, 2009). In 2010 Spanish doctors conducted the world's first full face transplant on a man injured in a shooting accident. A number of partial face transplants had already taken place around the world (Bilgel *et al.*, 2006). **Objectives:** To assess the knowledge among undergraduate students about organ donation, their attitude and commitment towards donation of organs and various factors affecting organ donation. **Methodology:** A cross sectional study was planned for undergraduate students of Santhiram Medical College, Nandyal, District Kurnool, by developing a three part questionnaire in April 2014. Study was conducted and subjected for statistical analysis. **Observation and Results:** Study participants have heard of donation and have some knowledge of organ donation, but none have donated. No statistical association was found between age, sex, year of study, religion, socio-economic status to donate organs. Print medias were main source of information. Family person was first concern for donation. Student were reluctant to donate smokers, alcoholics addicts etc. **Conclusion:** Organ donation and transplantation curriculum should be included in undergraduate syllabus, looking to great need of organ donation in future.

INTRODUCTION

In many parts of the world, there is a shortage of cadaveric organs for transplantation. Worldwide, more than 20% of patients on transplant waiting lists die every year due to shortage of donor organs (Cantarovich, 2002). The situation in India is of particular concern, the organ donation rate being very low. The Govt. of India has enacted the Transplantation of Human Organs Act 1994. The act legalized brain death and provided regulations related to the retrieval, storage and transplantation of organs from brain dead donors. However, this concept has not caught on well and there is still a huge gap in the demand and supply of human organs and tissues. This is primarily due to lack of awareness and acceptance of brain death in the society. The approximate estimated demand in this field is every year 1 lakh corneas are required but only 25,000 are transplanted. Every year 1-1.5 lakh kidneys are required but only 3,500 – 4,000 are transplanted. Every year 15,000 – 20,000 liver are required but only 500 are transplanted. The need far exceeds the demand of transplant organs. There are several reasons for shortage of organs like inadequate finance, ignorance, lack of appropriate organ donors and proper medical facilities. There are significant social and economic impacts arising from the non-availability of organs and tissues for transplantation.

People who are waiting for an organ transplant have to undergo debilitating, time consuming and expensive treatment. It is hard, not impossible, for adults to continue to work, and their ability to spend quality time with their friends is greatly reduced. People who are waiting transplant miss out a significant part of their productive lives, while their families suffer the anguish of watching the health of their near and dear ones deteriorate day by day (ORBO). Overall, globally the prevalence of knowledge for organ donation ranges from 60% to 85% (Ashraf *et al.*, 2005). As future doctors, medical students will take up the role of promoting organ donation. However, many lack relevant basic knowledge and are influenced by personal attitudes and biases held by the general public, which impinge on health care professionalism (Christina *et al.*, 2008). Insufficient knowledge and failure to identify possible donors are considered important contributing factors responsible for the shortage of available organs. There is also a discrepancy between attitudes and actions. In 1982, on December 2, Barney Clark receives the first artificial heart; he survives for 112 days (Amy Van Zee, 2011). In 2005, Baltimore's Johns Hopkins Hospital pioneered the "domino chain" method of matching donors and recipients. Willing donors who are genetically incompatible with their chosen recipients are matched with strangers; in return, their loved ones receive organs from other donors in the pool. In 2010, Spanish doctors conducted the world's first full face transplant on a man injured in a shooting accident. A number of partial

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face transplants had already taken place around the world (Organ transplant, 2012).

Aims and objectives

- To assess the knowledge among the undergraduate students about organ donation.
- To study their attitudes and commitment with regard to organ donation
- To assess the correlation between knowledge, attitudes and commitment towards organ donation.
- As a capacity building exercise for medical college students as future coordinators for organ donation.

MATERIALS AND METHODS

Type of study: Cross-sectional descriptive study.

Study period: From 1st April to 31st April, 2014.

Setting of the study: Santhiram Medical College (SRMC), Nandyal, District Kurnool;

Study group: 386 undergraduate students from SRMC, Nandyal

Inclusion criteria: Only registered students from above mentioned college

Sample size: -Sample size was calculated assuming a prevalence of 50% from past studies for knowledge, attitude and practice of organ donation, a 95% confidence interval and a sample error of 5%.

$$\text{Formula: } n = \frac{Z_{1-\alpha/2}^2 P(1-P)}{d^2}$$

where P is expected prevalence of knowledge, attitude and prevalence of organ donation. d= Absolute precision 5%, α = Significance level 5%. If $\alpha = 5\%$, then $Z_{1-\alpha/2} = 1.96$, Z = Standard normal variant⁷

Using the above formula, sample size of 386 medical students were taken into consideration for study.

Research Tool: A modified pilot- tested structured questionnaire was used to explore knowledge, attitude and practice on organ donation among the students. Questionnaire was divided into 3 parts containing questions. The first part had questionnaires on socio-demographic aspects which include elements such as age, year of study, sex, religion, education of parent, occupation of parent and family income of parent. Modified Kuppaswamy's classification (2012) was used for socio-economic analysis. Second part was designed to test the knowledge of the medical students regarding organ donation. Questions addresses areas such as participants' understanding of the term "organ donation", present scenario of organ transplantation, definition of brain death, medical experts who can certifying brain death, organs can be donated, organ donation from a living person, dead person, unclaimed bodies and from mentally challenged person, age limit for donation, risk for donor associated with organ donation, religious aspects for donation and inclusion of organ donation in curriculum. Third part includes psychosocial questionnaire to evaluate attitude towards donation. The following independent variables were studied.

A. Behaviour commitment towards donation (Willingness to donate organs, willingness to sign donor card). B. Social interactions (attitude towards donating family members, friends / colleagues, attitude towards donating towards same religious, same caste, same status, alcoholic recipient or smoker recipient.). C. Attitude towards body (fear of organ misused / wasted, harmful for donor, concern about mutilation of body after donation.) Last part of questionnaire includes practice in the form of asking question whether the participant ever donated an organ.

Analysis of data: Statistical analysis was performed using statistical software STATA version 10.0. Categorical variables were expressed in actual numbers and percentages. Categorical variables were compared using Pearson's Chi-square statistics and test for linear trend were used where on necessary for the inferential statistics. $P < 0.05$ was considered as statistical significance.

Ethical clearance: The necessary permission and clearance was obtained from the Institutional Ethical Committee. The respondents were assured about the confidentiality and ethical principles that would be followed, and the background and purpose of the study were explained before the questionnaires were distributed.

OBSERVATIONS AND RESULTS

Socio-demographic characteristics of the study population (n=386)

In this study, as shown in table no.1 to 6, out of 386 students, 297(76.95%) were in age group of 18-21 years and 89(23.05%) were in age group of 21-24 years. In the present study, out of 386 students, 151(39.12%) were male and 235(60.88%) were female. In this study, out of 386 students, 328(84.97%) were Hindus, 26(6.73) Christians and 32(8.30%) were Muslims. Out of 386 students, 94(24.35%) were first year students, 142(36.79%) were second year students, 77(19.95%) were third year and lastly 73(18.91%) were fourth year students. According to Modified Kuppaswamy's classification (2012), 139(36.01%) belongs to upper class, 158(40.94%) belongs to upper middle class, 58 (15.02%) belongs to lower middle class and 31(8.03%) belongs to upper lower class. All the students (386) had some knowledge on organ donation. In this study of 386 students, most common source of information about organ donation was found to be print media - news paper or magazines(41.19%) followed by doctor 67(17.35%), television 54(13.98%), friends / relatives 31(13.98) and lastly by others 75(19.43%) which includes teachers, parents, internet, radio and lastly combinations of different sources 75(19.43%). Table 7 shows the different factors that a prospective donor will consider. The factor considered were relationship of donor with recipient, age of recipient, religion of recipient, health status of recipient, smoking / alcoholic habit of recipient and consideration of misuse of organs. It was found relationship of donor with recipient, age of recipient and misuse of organs after donation were important concerns for consideration for donation. Religion was not an important factor for consideration in donating organ. The results were statistically not significant. Table 8 shows the prospective donor considers while donating an organ. The factor considered were infection, body weakness, anxiety / depression, pain, bleeding. Bleeding was not a never considered an important risk factor by donor for donating organ.

Table 1. Age, gender and religion wise distribution of students

| Age groups | Total | Male | Female | Religion | | |
|------------|------------|-------------|------------|------------|----------|-----------|
| | | | | Hindu | Muslims | Christian |
| 18-21 yrs | 297(76.95) | 116(39.05) | 181(61.94) | 252(84.84) | 25(8.42) | 20(6.74) |
| 21-24 yrs. | 89(23.05) | 35(39.32) | 54(60.68) | 76(85.39) | 7(7.86) | 6(6.74) |
| Total | 386. | 151.(39.12) | 235(60.88) | 328(84.97) | 32(8.29) | 26(6.73). |

Table 2. Current year wise distribution and socio-economic characteristics (based on modified kuppaswamy's classification (2012)), of students

| Year of study | | | | Total | Socio-economic character. | | | |
|---------------|------------|-----------|-----------|-------|---------------------------|--------------|--------------|--------------|
| I | II | III | IV | 386 | Upper | Upper middle | Lower middle | Upper lower. |
| 94(24.35) | 142(36.79) | 77(19.95) | 73(18.91) | | 139(36.01) | 158(40.94) | 58(15.02) | 31(8.03) |

Table 3. Association of Gender and Age distribution of students with willingness to donate organ

| Response | Gender | | | Age Distribution. | | |
|------------------------|-----------|------------|------------|-------------------|-----------|------------|
| | Male | Female | Total | 18-21 yrs | 22-24yrs | Total |
| Willing to donate. | 45(29.80) | 73(31.08) | 118(29.62) | 88(29.62) | 30(33.72) | 118(30.56) |
| Not willing to donate. | 38(25.16) | 59(25.10) | 97(25.12) | 74(24.91) | 23(25.84) | 97(25.12) |
| Will think about it. | 68(45.03) | 103(43.82) | 171(44.38) | 135(45.45) | 36(40.44) | 171(44.82) |

Table 4. Association of year of study distribution of students and religion with willingness to donate organ

| | Study year. | | | | Total | Religion. | | | Total |
|------------------------|-------------|------------|------------|------------|-------------|-------------|------------|------------|------------|
| | I | II | III | IV | | Hindu. | Muslim. | Cristian. | |
| Willing to donate. | 28 (29.78) | 42 (29.57) | 25 (32.46) | 23 (31.50) | 118 (30.56) | 98(29.87) | 11(34.37) | 9(34.61) | 118(30.56) |
| Not willing to donate. | 23 (24.46) | 35 (24.64) | 20 (25.97) | 19 (26.02) | 97 (25.12) | 82(25) | 8(25) | 7(26.92) | 97(25.12) |
| Will think about it. | 43 (45.74) | 65 (45.77) | 32 (41.55) | 31 (42.46) | 171 (44.3) | 148 (45.12) | 13 (40.62) | 10 (38.46) | 171 (44.3) |

Figures in the parenthesis indicate percentage.

$X^2=0.1031$, Df=2, p=0.94, Non-significant

The improvement in relation to religion was statistically not significant.

Table 5. Association of socioeconomic strata wise distribution of students with willingness to donate organ

| S. No. | Socio-economic class. | No. of students | Willing to donate organs | Not willing to donate organs | Will think about it |
|--------|-----------------------|-----------------|--------------------------|------------------------------|---------------------|
| 1 | Upper | 139 (36.01) | 42 (30.21) | 34 (24.46) | 63 (45.32) |
| 2 | Upper middle | 158 (40.94) | 48 (30.37) | 39 (24.68) | 71 (44.93) |
| 3 | Lower middle | 58 (15.02) | 18 (31.03) | 14 (24.13) | 26 (44.82) |
| 4 | Upper lower | 31 (8.03) | 10 (32.25) | 10 (32.25) | 11 (35.48) |
| Total | | 386 | 118 (30.56) | 97 (25.129) | 171 (44.3) |

Figures in the parenthesis indicate percentage.

$X^2=1.361$, Df=3, p=0.24, Non-significant.

Table 6. Association of source of knowledge and knowledge of organs which can be donated.

| Source of knowledge of 386 students. | | | | | Knowledge of 386 student about organ donated. | | | | |
|--------------------------------------|-------------|--------------------|------------|------------|---|------------|----------------|-----------------------|----------------|
| Newspaper/ Magazines. | Television. | Friend/ Relatives. | Doctor | Others | 1.Kidney only | 2.Eye only | 3.Kidney & Eye | 4.All mentioned organ | 5.Combine 2&4. |
| 159(41.19) | 54 (13.98) | 31 (8.03) | 67 (17.35) | 75 (19.43) | 104 (26.94) | 93 (24.0) | 76(19.6) | 19(4.92) | 94(24.35) |

Table 7. Distribution of students as per Most important factor considered while donating an organ

| Sr. No. | Factors | No. of students. |
|---------|---------------------------------------|------------------|
| 1 | Relationship of donor with recipient | 54 (13.98) |
| 2 | Age of recipient | 51(13.12) |
| 3 | Religion of recipient | 7(1.81) |
| 4 | Health status of recipient | 43(11.13) |
| 5 | Recipient not be alcoholic and smoker | 184(47.66) |
| 6 | Misuse of organs | 47(12.17) |
| Total | | 386 |

Figures in parenthesis shows percentage.

Table 8. Distribution of students according to Maximum age limit for donating the organ

| Sr.No. | Options | No. of students. |
|--------|--------------|------------------|
| 1 | 20-40yrs | 119 (30.82) |
| 2 | 40-60yrs | 58 (15.02) |
| 3 | 60-80yrs | 76(19.68) |
| 4 | No age limit | 81(20.98) |
| 5 | Don't know | 52(13.47) |
| Total | | 386 |

Figures in parenthesis indicate percentage.

The results were statistically highly significant. Table.9. shows the maximum age limit a prospective donor considers for donating an organ. The options were 20-40yrs, 40-60yrs, 60-80yrs, no age limit, answer not known.

Table 9. Distribution of students according to Maximum age limit for donating the organ

| Sr.No. | Options | No. of students. |
|--------|--------------|------------------|
| 1 | 20-40yrs | 119 (30.82) |
| 2 | 40-60yrs | 58 (15.02) |
| 3 | 60-80yrs | 76 (19.68) |
| 4 | No age limit | 81 (20.98) |
| 5 | Don't know | 52(13.47) |
| Total | | 386 |

Figures in parenthesis indicate percentage.

The results were statistically highly significant.

Table 10. Distribution of students Consideration of prospective donor for donating organ if necessary and willingness to sign donar card

| Options | Prospective donar if necessary. | Willing to sign donar card. |
|-----------------------------------|---------------------------------|-----------------------------|
| Yes | 125(32.4) | 82(21.24) |
| No. | 89(23.05) | 141(36.52) |
| Will think about it. | 165(42.74) | 157(40.67) |
| Only under special circumstances. | 7(1.81) | 6(1.55) |
| Total | 386 | 386 |

Figures in parenthesis indicate percentage.

Table 10 shows a prospective donor agreeing to donate organ if it becomes necessary. The options were definitely, never, will think about it and lastly only under special circumstances.

Table also shows a prospective donor agreeing to sign organ donor card. The options were yes, no, will think about it and lastly only under special circumstances. Table 11 shows a prospective donor consideration for ethical issues for organ donation. The options were important, not important and lastly don't know. Table 11 shows a prospective donor consideration for donating an organ. The options were family members, anybody, friend and colleague and lastly no body. Table12 shows a prospective donor consideration for donating an organ. The options were recipient should be non-smoker and non-alcoholic, recipient should be of same caste, religion and of equal status and lastly no special consideration. Table 12 also shows a prospective donor consideration for recipient age for donating an organ. The options were recipient should be young / productive person, recipient should be young or old, and lastly don't know. Table no. 13 depicts students distribution according to consideration of willingness to donate organs. Table 14 shows overall knowledge of medical students regarding organ donation. For assessment of overall knowledge, meaning of organ donation, meaning of brain dead, age limit for organ donation and lastly laws connected to organ donation was taken into consideration.

The results were statistically highly significant
Figures in parenthesis indicate percentage.

Table 14 shows overall knowledge of medical students regarding concept of brain dead. For assessment of overall concept of brain dead, meaning of brain dead, possibility of organ donation after brain death, and lastly authorization of certifying brain dead was taken into consideration. Table 15 shows overall knowledge of medical students regarding medico-legal aspect of organ donation.

Table 11. Distribution of students according Consideration of ethical issues and other consideration of donating organ

| Consideration of ethical issues | | | | Consideration of donars | | | |
|---------------------------------|---------------|------------|--------|-------------------------|-----------|-----------|--------|
| Important | Not Important | Don't know | Total. | Family Members. | Any body. | Nobody. | Total. |
| 81(20.98) | 47(12.18) | 258(66.84) | 386. | 259(67.09) | 74(19.17) | 53(13.73) | 386. |

Figures in parenthesis indicate percentage.

Table 12. Distribution of students according to Consideration of factors for donating organs

| Sr. No. | Options | No. of students. |
|---------|---|------------------|
| 1 | Recipient should be non-smoker and non alcoholic | 197(51.03) |
| 2 | Recipient should be of same caste, religion and of equal status | 58(15.02) |
| 3 | No special consideration | 131(33.93) |
| 4 | Recipient should be young/productive person. | 121(31.34) |
| 5. | Recipient can be young or old. | 110(28.49) |
| 6. | Don't know. | 155(40.15) |

Figures in parenthesis indicate percentage.

Table 13. Distribution of students according to Consideration of willingness to donate organ

| Sr. No. | Options | No of student. |
|---------|------------|----------------|
| 1 | Yes | 118(30.56) |
| 2 | No | 97(25.12) |
| 3 | Don't know | 171(44.3) |
| Total | | 386 |

Figures in parenthesis indicate percentage.

Table 14. Distribution of Overall knowledge of medical students regarding organ donation and concept of brain dead

| Knowledge of organ donation. | | | | | Knowledge of concept of Brain dead. | | | |
|------------------------------|-----------------------|-----------------------------|----------------------------------|-----------------|-------------------------------------|--|--|------------------|
| Meaning of organ donation. | Meaning of Brain dead | Age limit of organ donation | Laws connected to organ donation | Total knowledge | Meaning of brain dead | Possibility of organ donation after brain dead | Authorization of certifying brain dead | Total Knowledge. |
| 137 (35.49) | 126 (32.64) | 81 (20.98) | 61 (15.80) | 405/1544 (26.2) | 126(32.64) | 196(24.87) | 253(65.54) | 575/1158 (41.01) |

Figures in parenthesis indicate percentage.

For assessment of overall medico-legal knowledge of organ donation, questions pertaining to presence of laws associated with organ donation, consent for living person, consent for dead person, consent for

Table 15. Distribution of students according to Overall medico legal knowledge

| Sr.No. | Options | No. of students. |
|--------|---|--------------------|
| 1 | Presence of laws associated with organ donation | 61(15.8) |
| 2 | Consent for living person | 60(15.54) |
| 3 | Consent for dead person | 56(14.5) |
| 4 | Consent for unclaimed body | 40(10.36) |
| 5 | Consent for mentally disabled | 59(15.28) |
| | Total | 276/1930 (14.3) |

Figures in parenthesis indicate percentage.

unclaimed body and lastly consent for mentally disabled were taken into consideration. The results were statistically highly significant. Table 16 shows overall attitude of medical students regarding organ donation. For assessment of overall attitude, questions pertaining to agree to donate your organs if necessary, willing to sign donor card, consideration of positive factor for donating organ and consideration of ethical issues were taken into consideration. The results were statistically highly significant. For assessment of overall knowledge, meaning of organ donation, meaning of brain dead, age limit for organ donation and lastly laws connected to organ donation was taken into consideration. Overall scoring of attitude was done by summation of each four variables for testing attitude. Similarly for assessment of overall attitude, questions pertaining to agree to donate your organs if necessary, willing to sign donor card, consideration of positive factor for donating organ and consideration of ethical issues were taken into consideration. Overall scoring of attitude was done by summation of each four variables for testing attitude.

Table 16. Distribution of students according to Overall assessment of positive attitude

| Sr.No | Options | No of students. |
|-------|---|---------------------|
| 1 | Agree to donate your organs <i>if necessary</i> | 125(32.4) |
| 2 | Willing to sign donor card | 82(21.24) |
| 3 | Consideration of appropriate positive factor for donating organ | 131(33.93) |
| 4 | Consideration of ethical issue | 81(20.98) |
| | Total Positive Attitude. | 419/1544 (27.13) |

Figures in parenthesis indicate percentage.

DISCUSSION

Heard of Organ donation

All the study participants in the present study had heard about organ donation which is in accordance with earlier study by Usha Bapat *et al.* (2009) among post graduate medical students. This could be attributed to the medical background of students. Studies among general public have also found similar results which have been attributed to high literacy level (Ozdog, 2004; Prasanna Mithra *et al.*, 2013).

Source of knowledge for organ donation

In our study, primary source of knowledge was from print media [news papers / magazines] (41.19%). This was followed by doctor (17.35%), television (13.98%), friends / relatives

(13.98%), other sources (19.43%) which include teachers, parents, internet, and radio and lastly combinations of different sources (19.43%). Audiovisual media have been the major source of knowledge in several other studies (Corona Brezina, 2010; Bilgel *et al.*, 2006; Taimur Saleem *et al.*, 2009; Usha Bapat *et al.*, 2010). The potential role of doctors as a source of knowledge regarding organ donation is underutilized. This is evident from the low frequency in our study as well as earlier studies (Bilgel *et al.*, 2006; Taimur Saleem *et al.*, 2009). There is a felt need to empower and sensitize medical students with knowledge on organ donation. This might change the scenario in future.

Knowledge about organs which can be donated

In our study, majority of students listed transplantable organs correctly like eye, kidney, liver, heart, pancreas, bone marrow. Present study results were parallel to those cited in other studies where majority knew about only two organs which can be donated i.e. kidneys and eyes (Amalraj and Edwin, 2000; Sobnach *et al.*, 2010). These studies exemplify the lack of knowledge among not only general public but also medical students. Evaluation of the incorporation of a formal organ donation and transplantation curriculum is encouraged.

Concept of brain death

In our study, meaning of brain death, authorization of brain death and possibility of organ donation after brain death were taken into consideration for concept of brain death. The overall understanding of the concept was 41.01%. Earlier studies revealed that the knowledge of brain death among medical students ranged between 10.5%- 75%. (Christina *et al.*, 2008; Amalraj *et al.*, 2000; Trevor Bardell *et al.*, 2013; Bilgel *et al.*, 2006). Importance of brain death could be explained on the basis of a study conducted by Antonio Ríos Zambudio (2003) in Spain among nurses which inferred persons who do not understand the concept of brain death or who are mistaken about it have a more negative attitude toward the matter than persons who do. In that study, 34% of respondents did not understand the concept which was the main reason for not donating organs: fear of apparent death (Antonio Ríos Zambudio *et al.*, 2009). There is a need for increasing awareness and stressing the importance of brain death and organ donation. This can be achieved through newspaper, radio, television, religious meetings and discussions among family members and friends. Enhanced public awareness of the need for transplants was seen as the most important means of increasing organ harvest (Bardell *et al.*, 2002).

Knowledge on medico-legal aspect of donation

A study conducted by Alsultan M. (2011) in Saudi Arabia showed 80% awareness regarding legal aspects (Alsultan, 2012). Another study conducted by Ozdag (2004) in Turkey indicated 37.8% awareness (Ozdog, 2004). In our study, with regards to consent for donating organs from living and dead person, majority of students answered combination of different two to three options together. More or less similar findings were found in a survey conducted among general people in Karachi, Pakistan in 2008 where 76% respondents thought that the donor should be the one who can give consent for a living donation. Thirteen percent respondents thought that the family should give this consent while 5% opined that spouse should give this consent. Three percent of the respondents each

thought that friends and doctor should be the one giving the consent. For donation after death, 52.8% of the people thought that family should have the right to make decision for organ donation while 26.1% people believe that no one has the right to make this decision; only 6% felt that the doctor should be the one deciding this (Taimur Saleem *et al.*, 2009). In a study among medical college students of Hongkong done in 2008, 20% recognised that consent of close relatives was not legally necessary for the removal of organs in a registered organ donor (Christina *et al.*, 2008). As far as unclaimed bodies were concerned, students answered either singly or in combination multiple options - anybody, police, judge, collector and municipal authorities more or less in equal amount of percentages. In a survey conducted among general people in Karachi, Pakistan in year 2008 majority (35.2%) felt that the charitable organizations should have the right to decide on the issue regarding unclaimed bodies; while 22.3% felt that no one has the right to make such decisions (Taimur Saleem *et al.*, 2009). A survey conducted among general people in Karachi, Pakistan in 2008 showed 61% percent of the respondents felt that parents or guardians can make decisions on the behalf of mentally retarded persons regarding organ donation (Taimur Saleem *et al.*, 2009). Lack of knowledge regarding laws pertaining to donation could be a barrier for taking decision and result in failure to procure organs timely. Knowledge among doctors is also essential for counseling the donor and his relatives.

Overall knowledge on organ donation

For assessment of overall knowledge, meaning of organ donation, meaning of brain dead, age limit for organ donation and lastly laws connected to organ donation were taken into consideration. Meaning of brain dead and laws connected to organ donation are discussed earlier in this section. A study conducted by Christina KY Chung (2008) among medical students in Hongkong showed 28% of the respondents knew that organ donor registration bears no age restriction (Christina *et al.*, 2008). Study conducted among health care providers in intensive care unit in Riyadh, Saudi Arabia demonstrated that they possessed inadequate knowledge regarding organ donation and the actual procedures involved (Alsultan, 2012). A survey conducted among general people in Karachi, Pakistan showed 60% achieved an adequate knowledge score for organ donation (Alsultan, 2012). Thus the overall knowledge regarding organ donation is disappointingly low. These studies emphasize the need for revitalising the knowledge and awareness especially among healthcare professionals.

Age versus willingness to donate organs

There was statistically insignificant difference in percentage of students willing to donate organs in the age group 21-24 yrs compared to 18-21yrs. It seems advancing age and years of study in medical college increases knowledge and awareness which might have reflected in responsibility to donate organs. Our results are similar to earlier studies which found no significant association between age and motivation to donate (Antonio Ríos Zambudio *et al.*, 2009; Bilgel *et al.*, 2006; Taimur Saleem *et al.*, 2009).

Gender versus willingness to donate organs

In our study, females were slightly more willing to donate compared to males, though the difference was statistically non-

significant. Similar results were found in other studies which showed no significant difference between the two sexes regarding the inclination to donate organs (Taimur Saleem *et al.*, 2009; Alsultan, 2012).

Year of study versus willingness to donate organs

In our study, willingness to donate was more profound in third and fourth year students compared to first and second year students. This could be explained by advancing years of study wherein students derive more knowledge and exposure on organ donation.

Religion versus willingness to donate organs

Religion wise there was not much difference on willingness to donate, though Christians favoured organ donation more than the Hindus and Muslims, statistically this was non-significant. A survey conducted among general people in Karachi, Pakistan showed religion didn't have a significant association with the motivation to donate (Taimur Saleem *et al.*, 2009).

Social-economic class versus willingness to donate organs

In our study, based on modified Kuppaswamy's classification (2012), upper and upper middle class showed more inclination to donate compared to lower and upper lower, though this was statistically insignificant. Our results are similar to other studies which found positive attitudes among people from high socio-economic strata (Usha Bapat *et al.*, 2010). Perhaps, awareness increases and fear of consequence of organ donation decreases with advancing socio-economic class which empowers them to take positive decisions on organ donation.

Willing to donate organs

In our study overall 30.56% student were willing to donate organs, 25.13% were not willing to donate organs and 44.3% were, will think about it. Earlier studies showed willingness to donate organs ranged from 17.1% to 96% among medical college students, ICU health professionals, nurses and general public (Streng, 1998; Antonio Ríos Zambudio *et al.*, 2009; Teresa *et al.*, 2007; Bøgh L, Madsen, 2005; Bilgel *et al.*, 2006; Taimur Saleem *et al.*, 2009; Usha Bapat *et al.*, 2010; Alsultan, 2012).

Consideration of willing to donate organs

In our study, preponderance of donating to family member was starkly visible in case a prospective donor considered donating organ. 67.09%. Mentioned they would like to donate their organs to family members. Donation of the organ to a family member might be viewed as an "imperative" obligation or it might stem from a feeling of love and compassion for the family member. Moreover, this donation could be done simply because a person has faith and confidence that the organ is being given to a deserving recipient whom he has spent time with and has actually seen suffering from the effects of end organ disease. Being biased in donating towards family can therefore be viewed as a natural response of man – a social animal – who functions in society where the basic unit of architecture and the basic building brick is in fact family. A survey conducted among general people in Karachi, Pakistan in 2008 showed 51.1%, expressed their desire to donate their organs to a family member (Taimur Saleem *et al.*, 2009). A survey conducted in 2008 among 571 first-year medical

students at a medical faculty in Lyon, France showed willingness to donate a kidney to a relative. 97.7% of respondents consented, 0.9% objected, and 1.4% did not answer (Mekahli *et al.*, 2009). In another study conducted among medical college students in Germany showed, important factors for the decision on making organ donation were the definition and time of death, the use of the donated organs, consideration of the relatives and treatment of the corpse (Streng, 1998). A study among 305 nurses in Spain showed attitude was more favorable (83% in favor) if the partner was in favor and more negative if the partner was against (27%) or the partner's opinion was unknown (40%). Moreover, attitudes were more favourable when opinions about donation had been discussed at the family level. Attitude toward donation was also more favorable among those respondents who would be prepared to donate the organs of a family member if the decision had to be made.

Risk associated to donor

In our study, we found more number of students became aware of number of risks a living donor carries while donating organs by answering multiple risk factors associated with organ donation. A survey conducted among general people in Karachi, Pakistan showed 55.8% people were aware that organ donation is associated with some risk for the donor. However, 28.7% said that organ donation involves no risks. Among the risks, bodily weakness (34.1%) and infection (22.3%) were the two leading causes chosen by the respondents to be associated with organ donation. About 25% knew that organ donation could be associated with all: bodily weakness, infection, bleeding, pain, anxiety and depression (Taimur Saleem *et al.*, 2009). A study conducted in 2011 among 200 people visiting medical college hospital, Faisalabad, Pakistan showed 35.4% of respondents were unaware that organ donation may cause any harm to the donor and 64.6% replied that the donor may suffer from pain, infection, weakness and lethargy (Nahida Khan *et al.*, 2011). The perception of risks associated with organ donation is more or less similar among medical students and general public. This further highlights the loopholes in medical curriculum.

Barriers for donation

In our study majority of those who were against or undecided to donate organs believed family members may not agree to donation either living or dead. Other causes included fear of organ being misused, not wanting their body to be cut open and certain religious beliefs. The findings of our study correlate well with the study done among people seeking health care in tertiary care hospital in Mangalore in year 2013 (Prasanna Mithra *et al.*, 2013). A survey conducted among general people in Karachi, Pakistan featured that religious beliefs were cited as the leading cause among those who felt organ donation should not be promoted (Taimur Saleem *et al.*, 2009). A survey conducted among medical college students in Hongkong in 2008 showed concerns about premature termination of medical treatment, socio-cultural factors such as the traditional Chinese belief in preservation of an intact body after death, unease discussing death-related issues, and family objections to organ donation were significantly associated with a 'negative' attitude (Christina *et al.*, 2008). study among 123 postgraduate medical students in Bangalore showed religious beliefs as barriers to organ donation in 12%. These included belief that the body should be cremated without disfigurement,

superstitions, influence of social and cultural factors, attitudes, educational status and the fear of being declared dead prematurely if a donor card is signed (Usha Bapat *et al.*, 2010). A study among 305 nurses of Spain showed fear of manipulation of the body as factor that makes donation difficult. Thus nurses have a more negative attitude toward donation when they are not prepared to have an autopsy carried out on themselves upon death if it were necessary. The study postulates one of the possible barriers preventing donation might be the attitude of health care professionals who are not always in favor and therefore do not create the right social climate to encourage participation (Antonio Ríos Zambudio *et al.*, 2009). These studies expose the myths associated with donation which need to be ironed out. This can be achieved through highlighting the positive aspects of donation via media and awareness campaigns.

Donor cards

In study conducted by Christina KY Chung (2008) among medical college students in Hongkong, the percentage of subjects who had signed the organ donation card was rather low - 23%, illustrating an apparent discrepancy between attitude and action (Christina *et al.*, 2008). In a study conducted by Bardell among (2002) among medical students in Kingston, Canada reported 30.8 % students carrying a signed card (Bardell *et al.*, 2002). A study done among medical college students in Kingston, Canada in year 2003 showed 41% of students correctly believed that in practice the wishes of a family override those expressed on an organ donor card (Trevor Bardell *et al.*, 2003). A study done among medical college students in Cape Town, South Africa in 2010 showed 8% students were registered as organ donors (Sobnach *et al.*, 2010). In a study among medical students in Ohio, USA in year 2005 it was noted that 80% students had signed a donor card and were willing to donate organs (Teresa *et al.*, 2007). Donor cards have been used in western countries to encourage awareness and practice of organ donation. Six percent of the Spanish population (Theodore Dardavessis *et al.*, 2011) and 5% of the Swedish were carrying donor cards. After an intensive campaign to promote organ donation by distributing brochures, the rate increased threefold in the following year in the same countries. A study conducted by Amalraj R Edwin (1996) revealed, 90% of the participants welcomed the method of carrying a donor card, as in western countries, permitting organ donation at the time of death or in a death due to an accident (Theodore Dardavessis *et al.*, 2011). A study conducted by Theodore Dardavessis (2010) among medical students in Greece revealed only 5.7% of participants indicated that they had registered to be organ donors. Measures should be generated to improve the signing rate of organ donation cards among medical students, such as making the process more convenient, publicising where to obtain them from, and education to correct misconceptions.

Overall attitude on organ donation

For assessment of overall attitude, questions pertaining to agree to donate organs if necessary, willing to sign donor card, consideration of positive factor for donating organ and consideration of ethical issues were taken into consideration. Study conducted in Riyadh, Saudi Arabia among health care providers in intensive care unit findings showed 96% of participants expressed favourable attitudes toward donation (Alsultan, 2012). Another study in Belgium demonstrated that

formal training is associated with improved attitudes toward organ donation (Pelleriaux *et al.*, 2008). A study among medical college students in Hongkong showed majority 85% had a 'positive' attitude (Christina *et al.*, 2008). In our study, consideration of ethical issues was found to be important in 85.75 %. Similar findings were noticed in study conducted in 2011 among 200 person visiting teaching hospital in Faislabad, Pakistan where 90% considered organ donation ethically correct (Nahida Khan *et al.*, 2011).

Practice

Practice was measured by enquiring about actual donation of any organ. No student was found to have practiced organ donation. A study conducted by Nahida Khan (2011) among people visiting teaching hospital in Faislabad, Pakistan showed none of the respondents were actual donor (Nahida Khan *et al.*, 2011). Another survey conducted among general people in Karachi, Pakistan in 2008 showed that 3.5% had themselves donated an organ with only one person having donated a kidney and the remaining ten reported donating blood on one or more occasions (Taimur Saleem *et al.*, 2009). The practice of organ donation is thus disappointingly low. In context to our study, it was unlikely to find anyone who has ever donated an organ considering their tender age group.

Curriculum on organ donation

In our study, majority of students believed separate topic on organ transplantation was not included in school/ college curriculum. Corresponding finding were noticed in study done among medical students at Chennai in 1996 where 90% of the participants felt that including a topic on organ donation in the syllabus of the undergraduate medical course would be welcome (Amalraj *et al.*, 2000).

Conclusion

1. All the study participants have heard of organ donation and had some knowledge of organ donation.
2. No students ever practised organ donation by donating organ
3. There was no statistical co-relationship found between age, sex, year of study, religion, socio-economic status based on modified Kuppuswamy's classification (2012) and willingness to donate organs.
4. Print media (newspaper/ magazines), doctors, television in that order were the source of information for organ donation among students.
5. Donating organs to family persons was the commonest consideration for donation. Students were found to be apprehensive of donating organs to persons who were smokers and alcoholic. In majority of students, religion did not come in the way for donating organs.
6. Students had positive attitude towards including separate topic of organ donation/ transplantation in their curriculum.

The limited knowledge of medical students about organ donation is likely a result of a paucity of teaching on the subject in the undergraduate medical curriculum. Without such teaching, it is unclear where future physicians will acquire this knowledge on how to identify potential donors and how to approach the potential donor's family. It should be noted that physician knowledge on the subject of organ donation is just

one of the many requirements for maximizing organ donation rates. A sensitive approach and good communication are also important skills. In view of our results, undergraduate medical education committees at all universities should consider curriculum review.

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