

ISSN-0971-720X (Print) • ISSN-0973-1283 (Electronic)

Volume 22 Number 3 July-September 2022



Medico-Legal Update

An International Journal

www.medicolegalupdate.org

Medico-Legal Update

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Website: www.medicolegalupdate.org

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Published at

Institute of Medico-legal Publications

Logix Office Tower, Unit No. 1704, Logix City Centre Mall,
Sector- 32, Noida - 201 301 (Uttar Pradesh)



Medico-Legal Update

An International Journal

medicolegalupdate.org

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Postmortem Computed Tomography Imaging and Autopsy in Penetrating Neck Injury Case: A Comparative Study

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How to cite this article: Babulal Chaudhary, Ankit Kumar, Pankaj Sharma, Abhishek Yadav, Rishi Sharma et al Postmortem Computed Tomography Imaging and Autopsy in Penetrating Neck Injury Case: A Comparative Study. Volume 22 | Number 3 | July-September 2022

Abstract:

Objective: This study compares and contrasts traditional autopsy with postmortem computed tomography in a homicide case of penetrating neck injury.

Method: Autopsy and postmortem computed tomography (PMCT) findings were compared.

Results: PMCT demonstrates the presence of air embolism, surgical emphysema, the direction of the wound, entry, and weapon trajectory. Autopsy proved helpful in terms of external examination.

Conclusion: PMCT was superior to the internal inspection at autopsy in the presented case and has added value for detecting additional findings regarding the cause of death. However, a combination of both techniques increases the quality of postmortem evaluation.

Keywords: Virtopsy; virtual autopsy; neck injury; stab; postmortem imaging; postmortem examination

Introduction:

Computed Tomography (CT) is gaining popularity as a diagnostic imaging technique in medicolegal autopsies and forensic examinations. Postmortem

Computed Tomography (PMCT) is now widely accepted¹ and adopted in several countries². PMCT has been used extensively worldwide for more than a decade³⁻⁶. In England and Wales, the public has a right to request PMCT as an alternative to autopsy⁷.

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Multislice CT performs the virtual autopsy and provides 3D reconstruction with higher resolution and better image quality. PMCT is exceptionally beneficial to track the trajectory of a weapon or the path of a bullet through the body and helps reconstruct the event⁸. It is critical to consider the advantages and limitations of PMCT, particularly image interpretation.

PMCT advantages

- Extremely sensitive in detecting fractures (facial bones, atlas/axis, scapular, and cervical), intraventricular hemorrhage, and pneumothorax^{9,10} skull base, facial bones and atlas/axis.
- Ideal for visualizing bones (e.g., fracture pattern)^{11,12} avulsion of the neural arch from the vertebral body of the axis (C2, calcification within the brain parenchyma¹³, air/gas embolism¹⁴, acute hemorrhage, and tracheobronchial content¹⁵ the authors experienced discrepancies of tracheobronchial content findings between postmortem computed tomography (PMCT).
- Simple visualization of foreign objects (e.g., bullets) and their locations, as well as bullet trajectories¹⁶ localization of gunshot injury, caliber, and direction of the gunshot differentiating between entry and exit wound as well as associated injury to surrounding tissue. The results of both reader groups were compared to the each other and to autopsy findings considered as gold standard. Results: Reader groups I and II and as gold standard the autopsy evaluation showed in general a good correlation between all results. The overall discrepancy rate was 12/51 (23.4 %).
- Ideally suited for burn-related cases¹⁷ to detect thermal fractures, heat injuries, extremity contraction and destruction, and thermal epidural hematoma.
- Identify critical findings in drowning cases (e.g. hemodilution, paranasal and tracheal fluid collection, emphysema aquosum)¹⁸.

- Used to aid in identification in the event of a mass disaster.
- In the current coronavirus pandemic scenario, it will also aid in reducing coronavirus infection spread among mortuary staff and forensic experts.
- There is a significantly reduced risk of infection transmission to the healthcare worker.
- Facial reconstruction and 3D volume rendering are possible in the case of mutilated body.
- Non-invasive preserves the integrity of the corpse, fast acquisition.
- Multiple analyses are possible with digital data storage.

Limitations

- Limited visualization of soft tissue
- Artifacts (e.g., prosthetics, valves, and implants)
- Not available at all centres and associated costs
- Interpretation of PMCT images requires trained professionals.
- Poor sensitivity to detect external injuries such as bruises, superficial lacerations, and abrasions.

Indian researchers recently published a comparative study of traditional autopsy and PMCT in traumatic death cases, concluding that conventional autopsy remains superior to PMCT¹⁰ traditional autopsy (TA. The difficulty of PMCT detecting external findings has been mentioned repeatedly. Not only incised wounds or lacerations are essential to the medicolegal appreciation of a case, but also very superficial abrasions and hematomas or petechial hemorrhages, etc., findings that PMCT cannot detect. In this study, we present a homicidal penetrating neck injury in which PMCT scans were performed before the conventional autopsy, and this study aims to highlight whether PMCT provides additional information regarding the cause of death.

Method

A 26-year-old female was stabbed in the neck during a physical assault. The victim was rushed to AIIMS Rishikesh, where she was declared dead on arrival. All necessary paperwork and inquest procedure were completed. We performed a full-body PMCT examination approximately three hours after death. Immediately following the PMCT examination, the conventional autopsy was performed. The body was scanned supine with arms adjacent to the body while still sealed and wrapped. The body was scanned on a Philips 64-slice CT installed in the Department of Radiodiagnosis at AIIMS trauma centre using the following parameters: 1.5 x 40 collimation, 120 kV, and pitch 1.2 rotation time of 1 second. The acquisition time was 42 seconds for body volume imaging (including the lung), and images were reconstructed with a 1.5 mm slice thickness, 0.5 mm gap, and a smooth filter.

A board-certified radiologist performed image processing and interpretation. Both the forensic and radiologist experts were unaware of each other's findings. Multiplanar reconstructions and 3D volume rendering tools were used to analyze the images. CT was performed with the necessary ethical clearance from the institutional ethics committee, while family consent was not required in this case. Forensic experts unaware of the PMCT findings carried out the medicolegal autopsy.

Results

Observations from Postmortem Computed Tomography (PMCT)

CT results are comparable to those of a conventional autopsy. However, specific PMCT findings added to the overall picture. On the left side of the neck to the front (trajectory of the wound), below the hyoid bone, we observed a breach in the subcutaneous tissue (Fig 1 A). Hyoid bone and thyroid cartilage were unremarkable. The tracheal defect was continuous with the subcutaneous plane. A suspicious defect was observed in the anterior aspect of the esophagus at the D1/D2 vertebral level. Air embolism was discovered in vascular structures, most notably in the brachiocephalic artery, proximal part of the right

subclavian artery, and internal carotid artery (Fig 1 B). Emphysema was noted in the anterior wall of the larynx and neck, involving posterior paraspinal muscles on the right side (Fig 1 C), following the stab wound that pierced the skin, subcutaneous tissue, neck muscles, and neck internal carotid artery (Figure 2B, injury 3). Stab wound piercing the chest cavity (2.26 cm depth) resulting in right side hemothorax (Figure 1 D). Air embolism was found in the right ventricle (Fig 1 E), bilateral subclavian vein, and right superior vena cava (Fig 1 F). PMCT images also enable reconstruction of the weapon trajectories (in this case, knife) used for the assault like that described in conventional autopsy reports. The wound on the anterior part of the left side of the neck, touching the midline at the level of the D1 vertebra, is visible in a volume-rendered PMCT image (Fig 1 A). On CT, the presence of air embolism, irregularities in the skin, increased emphysema volume, and increased density indicates penetrating injury. After interpreting the images, we determined that a hemorrhage and traumatic air embolism caused the death.

Observations from conventional autopsy

In a conventional autopsy, major external injuries (Figure 2) were described in greater detail. On the right side of the face and neck, respectively, there was an incised wound measuring 12.5 x 0.4 cm and 7 x 0.4 cm (Fig 2A, Injury 1). A stab wound of size 4 x 0.5 x 4.5 cm was present on the left side of neck with the wound track going deep, cutting the internal carotid artery (Fig 2B, Injury 3). Incised wound of size 14.5 x 0.5 cm located horizontally on the left side of the neck and extending to the back of the neck (Fig 2C, Injury 4).

Multiple incised and stab wounds were described in 31 external antemortem injuries. The track of the wounds, their direction, and the type of probable weapon—a single or double-edged weapon—were all detailed to assist the investigating officer in reconstructing the crime scene during the investigation and court proceedings. Each internal organ was dissected and showed pallor of internal organs or even subendocardial hemorrhages, indicating severe blood loss. The cause of death declared by conventional autopsy was hemorrhagic shock due to injury to the vital structure of the neck.

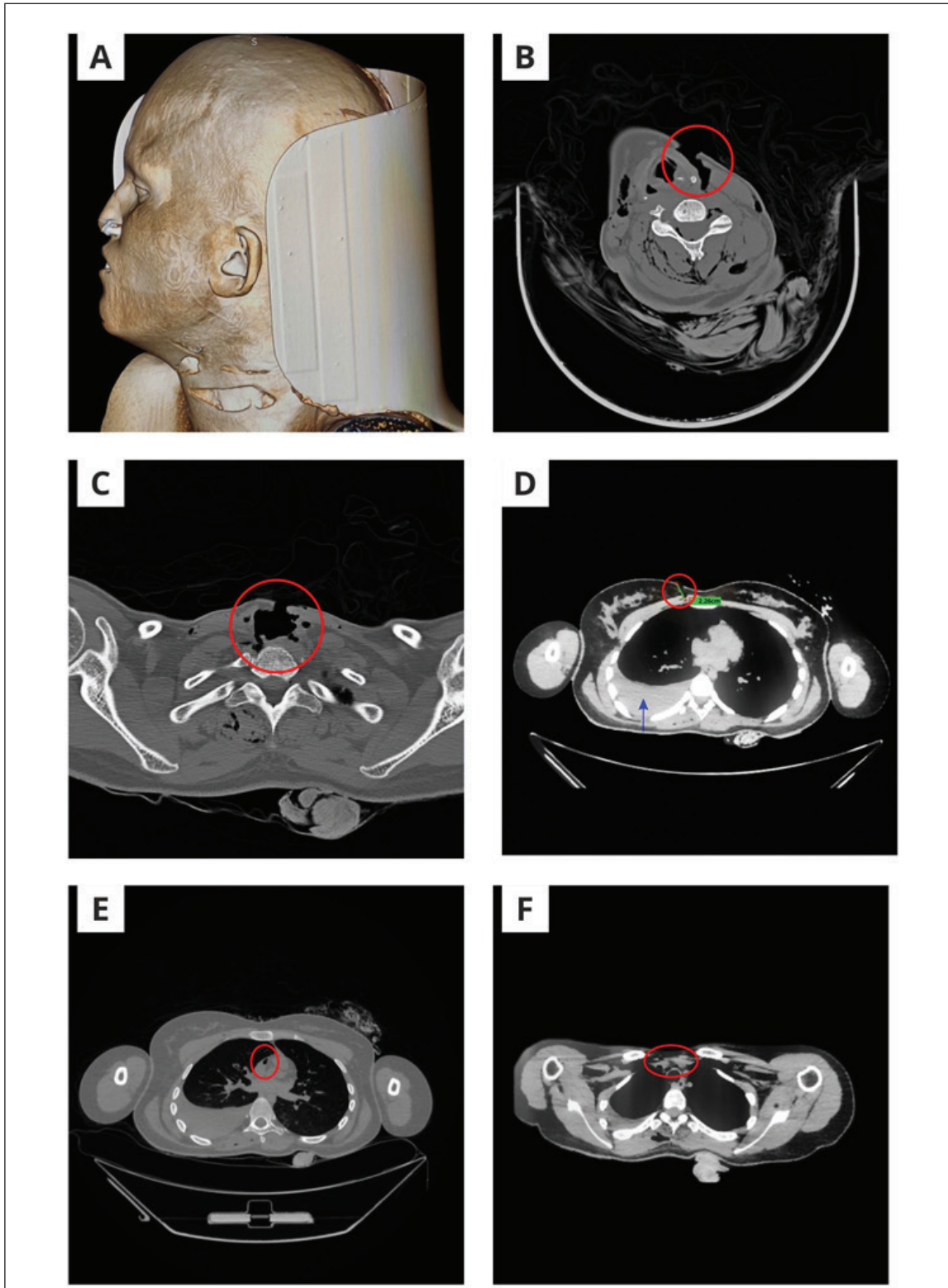


Figure 1. PMCT images, (A) Multiple breaches in skin and subcutaneous tissue of neck suggestive of an incised wound; (B) presence of air due to stab wound piercing the neck skin/subcutaneous tissue/ muscles and internal carotid artery; (C) Presence of air (red circle) due to breach in anterior wall of larynx and soft tissue; (D) Stab wound piercing chest cavity and black area in muscle shows air entering through wound with depth measurements with associated right side hemothorax (white area, blue arrow); (E) Air in the ventricle (red circle); (F) Black area inside red circle showing air in the vessels.

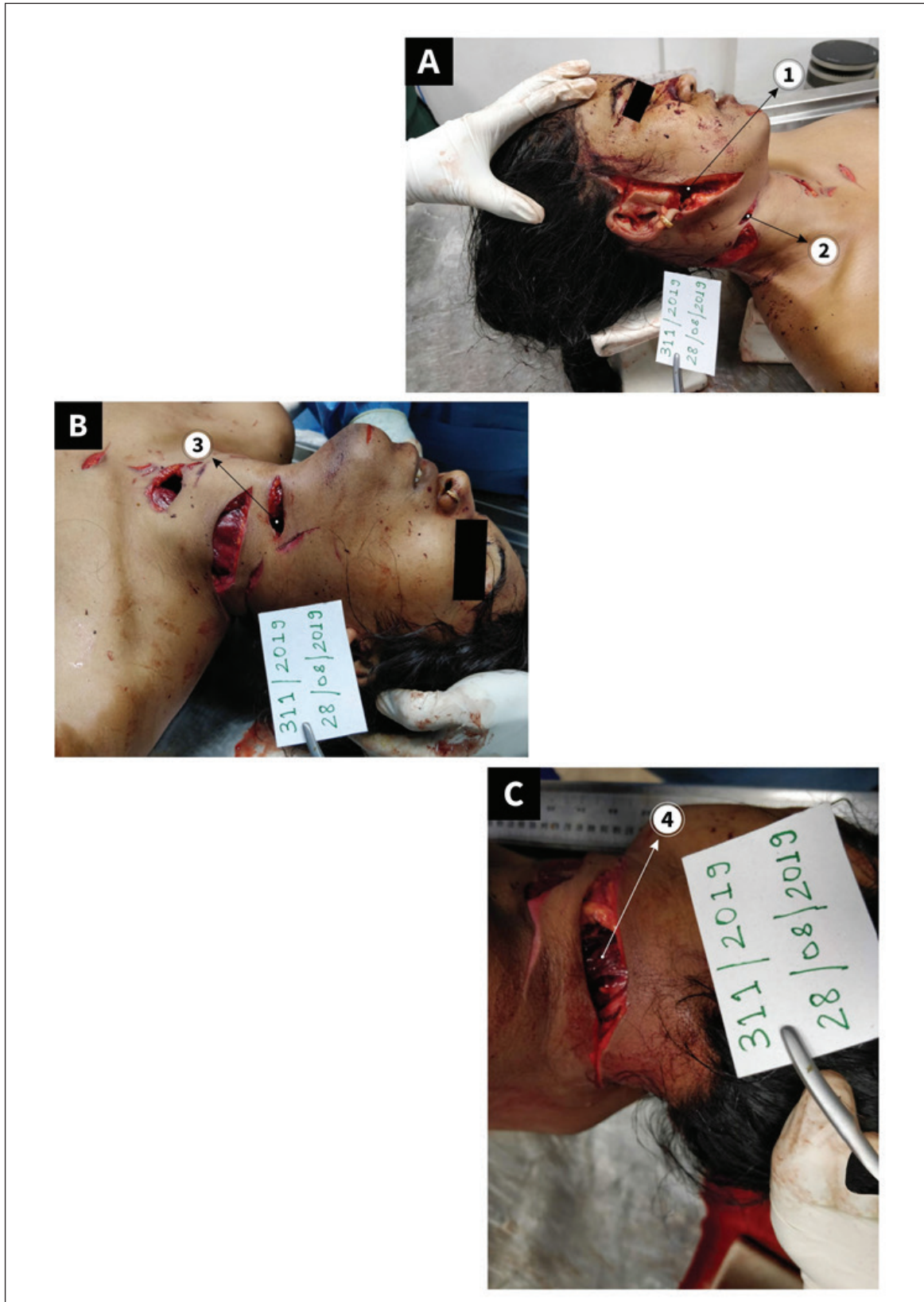


Figure 2. Autopsy appearance (A) injury no (1) incised wound over the right side of the face, injury no (2) incised wound over the right side of neck, (B) incised wound; injury no (3) stab wound over the left side of neck cutting internal carotid artery, (C) Injury no (4) incised wound present over left side of neck extending to the back of neck.

Discussion

In several countries, a thorough external inspection of the body at the scene, in conjunction with police investigation results, augmented with PMCT is sufficient for the district attorney. Occasionally, a toxicological screening (blood and urine) of different substances can be performed if one wants to exclude with reasonable certainty a drug-related death or incapacitation due to such substances. In India, the current legal system only accepts the postmortem report conducted by the traditional method, but the government has proposed adopting the virtual autopsy procedure in its legal system. The current case demonstrates how imaging can be a valuable tool in forensic examinations to ascertain the cause of death. PMCT has a higher sensitivity for detecting abnormalities in locations that are difficult to access during the conventional autopsy; it can significantly aid conventional autopsy in exceptional circumstances, such as tracing bullet trajectories or determining the direction of impact if circumstances allow for autopsy waiver.

Our study is unique as it presents PMCT and autopsy findings separately, allowing a gold standard to be created independently. Gas embolism is extremely difficult to detect during autopsy and is frequently overlooked^{19,20} by forensic experts, and non-description of air embolism is quite common²¹. In this case, vascular injury and air embolism were better identified during internal examination by PMCT; this outcome is consistent with a previous report by Schnider et al²¹. The likelihood of detecting subcutaneous emphysema during conventional autopsy is almost nil^{22,23} 40 forensic cases were examined and findings were verified by subsequent autopsy. Results were classified as follows: (I. This particular feature of PMCT outperforms conventional autopsy in this case.

Approximately 15-25% of penetrating injuries to the neck result in an arterial injury, involving the carotid arteries (80%) and vertebral arteries (43%)²⁴. In this case, PMCT discovered gas embolism in vital vascular structures such as the subclavian and common carotid arteries, implying that vascular air embolism was the primary cause of death. The conventional autopsy determined that the deceased died of hemorrhagic shock caused by injury to the neck's vital vascular structure, the internal carotid artery.

In our case, postmortem CT was of great help in identifying the wound course, the trajectory of the weapon (knife) Fig 1A, and vascular injuries. Determining the trajectory of the wound track aids in the evaluation of patients with penetrating neck trauma. However, the trajectory of penetrating injuries is often difficult to determine clinically because wound tracks often are not oriented in standard axial, sagittal, and coronal planes; liberal use of an interactive viewer to manipulate the dataset is essential to appreciate the true orientation of the neck. Although, In this case, due to PMCT, we can predict the cause of death and the trajectory of the wound track (Fig 1A) before the traditional autopsy, unable to determine the sequence of stab wound injury as multiple stab wounds were present on the victim's body.

Conclusion

We conclude that PMCT can have added value for detecting additional findings regarding the cause of death. However, PMCT and conventional autopsy will undoubtedly improve the diagnostic quality, reporting, and documentation of medicolegal autopsy reports. It is best used in conjunction with traditional autopsy rather than as a substitute for it recommended by forensic and radiology experts²⁵. PMCT provides more precise information than a traditional autopsy, but PMCT should, as in the case of autopsy (meaning the internal examination), never be used as a single method²⁶. The authors are adamant that the conventional autopsy approach is still necessary for investigation, particularly concerning the external examination. Image analysis was used to demonstrate the presence of gas embolism, subcutaneous emphysema, vascular injury, and weapon trajectory. PMCT should not be reported separately, and imaging findings must be interpreted based on possibilities, with the subject expert doing a detailed review of case history, medical history, and external examination.

Future recommendation

We believe that collaboration between radiologists and forensic pathologists on expertise, knowledge, interpretation, and technical pitfalls could help virtual autopsy become a highly accurate procedure

preceding standard autopsy. PMCT can be used in place of conventional autopsies in certain circumstances and is also an excellent complement in most cases. In the future, PMCT angiography method could be suggested for such cases, considering the presence of vascular injuries, which cannot be visualized by native PMCT. To summarize, one should first recognize the advantages and disadvantages of each approach before implementing the integrated procedure.

Ethical approval

This project has been reviewed and approved by the institutional ethical committee (AIIMS/IEC/19/945)

Funding: This research received funding from institutional intramural research grant (253/IEC/IM/2019).

Conflict of Interest: None

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Cross Sectional Study on Estimation of Stature from Index, Middle and Ring Finger in Adult Population of Hyderabad Telangana.

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How to cite this article: K Srinivasulu, Ankit Sunil Kulkarni, Uday Sankar Akash Vankayala, Akkalashetty Uday Shree, Doddikindiwad Madhulata Ravindra Reddy et al Cross Sectional Study on Estimation of Stature from Index, Middle and Ring Finger in Adult population of Hyderabad Telangana. Volume 22 | Number 3 | July-September 2022

Abstract

Cross sectional study on estimation of stature from length of fingers (Index, Middle and Ring finger of both the hands) was conducted on 150 individuals in the region of Hyderabad, Telangana. Study results showed that there is a significant correlation between length of fingers and stature, Index and middle finger lengths are more reliable than a ring finger length was observed in our study. The height of the individual is approximately 23 times the length of the ring finger, 21 times the length of the middle finger and 22 times the length of the index finger. Standard error of 1.34 to 1.60, R square less than 0.5 and P value less than 0.001 shows statistical significance of our study. The data was statistically analyzed by using SPSS (version-25) software. The formula for linear regression for estimating the height is $y = a + (b x)$.

Regression formulae for total population for right index finger is $y = 69.75 + (13.75 x)$, left index finger is $y = 66.05 + (14.15 x)$, right middle finger is $y = 63.75 + (13.21 x)$, left middle finger is $y = 62.79 + (13.25 x)$, right ring finger is $y = 71.88 + (13.24 x)$ and left ring finger is $y = 71.84 + (13.22 x)$. A separate linear regression equation for male and female found more accuracy than equation for total population was observed in our study. Calculated statures from these equations are close to the actual height, only ± 5 cm difference was observed in most of the individuals.

Keywords: Stature, finger length, regression equation.

Introduction

Forensic Anthropology is the branch of science that deals with the study of human remains in medico legal aspects. Stature is the distance from human feet to the vertex, when standing in erect position. Human height grows from intrauterine life to 20-25 years of age and later decline 2 to 2.5cm in every 25 years after the age of 30 years due to the natural senile degeneration¹. Stature even varies at different

times of the day by 1.5-2cms. It is usually less in the afternoon and evening hours due to reduced elasticity of inter vertebral discs and longitudinal vertebral muscles. Stature estimation is based on a principle that every body part has some constant relationship with height of an individual.

Anthropometry is the study of human body measurements. It is used to help forensic experts and anthropologists to estimate the stature of the

individual from different body measurements. Forensic anthropologist should explain age, sex, race and stature, commonly called as the “Big Four” of anthropology from skeletal remains examination; it helps to recognize the individual in mass disaster cases like plane crash, terrorist attacks and warfare.

The anthropometric correlation of a human stature with the arm or leg span has been known since ancient times as portrayed by Leonardo Da Vinci in his famous drawing, the ‘Vitruvian Man’ which depicts a man in two superimposed positions with his arms and legs apart and inscribed in a circle and a square². The length of the outspread arms is equal to the height of an individual. The measurement from bottom of chin to the top of the head is 1/8th the height of an individual.

The roots of forensic anthropology dates back to 1755’s in Europe, the measurement of body parts of cadavers aging from fetus to young adults by an art anatomy instructor Jean Joseph Sue lead to research of stature calculation, which was published by Orfila in the early 19th century³.

Alphonse Bertillon was a French police officer and biometric researcher who applied anthropological techniques in enforcement of law by creating an identification system based on physical measurements⁴.

Identification of the individual through stature becomes very easy when the entire body is found at crime scene, but in certain cases like plane crash, bomb blast, war crimes and other mass disasters where dismembered body parts or amputated limbs of the body are found, at such situations forensic anthropology techniques are useful to estimate stature and identification.

Several studies show that the regression equations yield better results for stature estimation. Regression formulae derived for one population does not always give accurate results for other populations, variations are because of nutritional, environmental and genetic factors. (Krogman & Iscan, 1986; Duyar & Pelin, 2010)⁵.

The aim and objective of our study is to determine stature from fragmentary bodies like Index, middle and ring fingers of hand in Telangana population, to derive a separate regression formulae for estimation of stature in this region. Study is very useful to forensic

scientists, anthropologists and law enforcement authorities to determine stature which in turn useful in crime investigation.

Materials and method

A Cross-sectional study on correlation of length of index, middle and ring fingers in relation to the height of an individual was conducted in Medical students of Hyderabad Telangana area in the age group of 18-25yrs. Maximum height usually attained in this age group hence these age group individuals were selected for this study. Body parts like index, middle and ring fingers length of both right and left hand measured separately in male and female individuals. A total of 150 individuals among 75 males and 75 females of Telangana area were taken as participants in this study after obtaining informed consent from all the participants. A healthy individual of normal skeletal growth and without any skeletal deformities were included in this study. Individual with genetic, hormonal, nutritional and skeletal disorders or abnormalities were excluded.

The instruments used in this study are vernier caliper, scale, stadio-meter (Height stand) and weighing machine. Height was measured using stadio meter in standing posture. Measurements of the Body parts, finger length has taken as distance between the proximal wrist creases to the tip of the finger in midline was measured by using vernier caliper, students were asked to place their hand on a table with palm facing upwards and fingers are in extended flat position and the measurements were taken.

Statistical Analysis

Analysis was done by descriptive statistics like mean standard deviation, Correlation coefficient and linear regression. P value < 0.05 was considered as statistically significant. The data was analyzed by using SPSS (version-25) software. The formulae for linear regression for estimating the height is $y = a + (b \times x)$, (y = dependent variable (height). a = constant. b = independent variable coefficient. x = independent variable i.e. length of the finger).



Figure 1: Measurement of middle finger length using vernier caliper.

Results

A cross sectional study on correlation of stature from Fingers length index, middle and ring fingers of both right and left hand was conducted on 150 individuals, among 75 males and 75 females in the age group of 18 to 25 years in the region of Hyderabad Telangana, the following observations were found.

Table 1: Study population Mean age (mean + SD)

Characteristics	Men	Female	Total
Age(mean ± SD)	19.80 ± 1.21	19.51± 1.26	19.66 ± 1.24

Table 2: Study population Mean height and weight (mean + SD)

Characteristics	Male	Female	Total	P value
Ht (mean ± SD) in cm	169.74± 7.14	156.80 6.80	163.40 9.51	<0.001
Weight (mean ± SD) Kg	57.05 ± 10.49	50.42 ± 11.45	53.80±11.43	<0.001

Table 2: The average height of the study population is 163.40 9.51(cm) among male average height is 169.74 7.14 and female average height is 156.80 6.80. The difference between mean stature of males and females in each group was statistically significant ($p < 0.001$). Weight proportion to the height was observed in the study population.

Table 3: Prediction of linear regression formula for total study population

Independent Variables (Length)	Formula($y = a + bx$)	R square	P value	Standard Error	95% Confidence Interval (CI)
Right Index Finger (cm)	$y = 69.75 + (13.75 x)$	0.49	<0.001	1.14	11.48 – 16.01
Left Index finger length (cm)	$y = 66.05 + (14.15 x)$	0.53	<0.001	1.08	12.00 – 16.03
Right middle finger length (cm)	$y = 63.75 + (13.21 x)$	0.55	<0.001	0.97	11.28 – 15.14
Left middle finger length (cm)	$y = 62.79 + (13.25 x)$	0.58	<0.001	0.93	11.42 – 15.09
Right ring finger length (cm)	$y = 71.88 + (13.24 x)$	0.56	<0.001	0.96	11.33 – 15.16
Left ring fingerlength (cm)	$y = 71.84 + (13.22 x)$	0.57	<0.001	0.94	11.35 – 15.10

y = dependent variable (height). a = constant. b = independent variable coefficient. x = independent variable i.e. length of the finger)

Table 4: Prediction of linear regression formula for Female population.

Independent Variables: (Length)	Derived Formula ($y = a + bx$)	R square	P value	Standard Error	Confidence Interval
Right Index Finger (cm)	$Y=94.00677+9.562513 x$	0.33	<0.001	1.55	6.31 – 12.49
Left Index finger (cm)	$y=87.70714+10.43777 x$	0.31	<0.001	1.63	6.32 – 12.83
Right Middle Finger (cm)	$y=85.80732+9.764081 x$	0.38	<0.001	1.39	6.60 – 12.15
Left Middle Finger (cm)	$y=86.54274+9.624353 x$	0.36	<0.001	1.51	6.85 – 12.88
Right Ring finger (cm)	$Y=90.53503+10.01065 x$	0.34	<0.001	1.45	6.27 – 12.08
Left Ring Finger (cm)	$y=90.5667 + 10.01007 x$	0.33	<0.001	1.51	6.11 – 12.14

Table 5: Prediction of linear regression formula for Male population.

Independent variable (Length)	Formula ($y = a + b x$)	R square	P value	Slandered Error	Confidence Interval
Right Index Finger (cm)	$y=103.4977+9.403386 x$	0.33	<0.001	1.60	6.34 – 12.76
Left Index finger (cm)	$Y= 101.4436+9.582213 x$	0.41	<0.001	1.45	7.51 – 13.31
Right Middle Finger (cm)	$Y=96.57112+9.380895 x$	0.44	<0.001	1.29	7.19 – 12.33
Left Middle Finger (cm)	$Y=92.0828+9.869744 x$	0.48	<0.001	1.17	7.22 – 11.89
Right Ring finger (cm)	$y=103.7343 +9.179499 x$	0.42	<0.001	1.36	7.13 – 12.57
Left Ring Finger (cm)	$Y=103.8295+9.129502 x$	0.43	<0.001	1.34	7.24 – 12.58

Discussion

Cross sectional study on estimation of stature from length of Index, middle and ring fingers among 150 individuals in the region of Hyderabad Telangana. The study results showed that there is a significant correlation between length of fingers and stature, Index and middle finger lengths are more reliable than a ring finger length was noticed in our study. It is approximately ring finger length multiply by 23, middle finger length multiply with 21 and index finger length multiply with 22 will get the stature of individual. A separate regression equation for male and female found more accuracy than equation for total population was observed in our study. Standard error of 1.34 to 1.60, R square less than 0.5, 95% confidence interval between 6 to 12 was observed in this study, P value less than 0.001 shows statistically more significant.

Several studies conducted in India and abroad found a great correlation between stature and finger length. Hence this equation can be considered for estimation of height in all mutilated bodies when other body parts are not available.

Raju *et al* carried out a similar study at Davangere, Karnataka⁶, India, by taking the measurement of Index and ring finger length of the right hand and height of 250 medical students (125 males and 125 females) of 18–25 years of age was observed significant positive correlation.

Tyagi AK⁷ *et al* also found significant relationship between finger length and stature and recommended the use of regression equation for stature estimation. Likewise, Shintaku and Furuya in 1990⁸ detected good association between middle finger length and stature among Japanese females.

Jasuja and singh⁹ also observed statistically significant correlation between stature and phalanges length and concluded stature could be estimated from their study parameters.

Vergheese AJ *et al* in Mysore and surrounding regions of Karnataka¹⁰ found significant correlation between middle finger length of both the hands and stature in males and females and recommended that those equations should be used for estimation of stature in their region of Karnataka.

Suseelamma *et al* conducted a study on 200 students (100 males and 100 females) at Kamineni Institute of Medical Sciences Hyderabad¹¹ to derive correlation between the stature and little finger length in both hands was found significant.

A study conducted at Manipal by Rastogi¹² *et al* explained a significant relation between middle finger length and height of an individual.

Krishan K *et al* conducted a study in a north Indian¹³ adolescent population and concluded that Index finger and Ring finger length has statistically significant correlation with stature of adolescent population of north India, stature of a person can be predicted with a reasonable accuracy from both the fingers.

Conclusion

Estimation of stature is the most important aspects in cases of identification, anthropological evidences in those cases where dismembered body parts are found. Stature estimation is based on a principle that every body part has some constant relationship with height of an individual. The results of the present study shows the significant correlation observed with the length of index, middle and ring finger of both

the hands and stature. Linear regression equations derived separately for the both the sexes are more reliable than the total population. Index and middle finger lengths are more reliable than a ring finger length was noticed in our study. ± 5 cm variations were observed in regression equation derived in our study. Several studies in India and Abroad also revealed similar correlation between finger length and stature.

Conflict of interest: Nil

Ethical clearance: Yes

Source of fund: self

Acknowledgement

We thank to our Professor of Community medicine Dr Ravibabu, for constant support and help in statistical analysis.

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Periodontal Disease And Type 2 Diabetics Versus Non diabetics In Adhamiyah Sector, Baghdad- Iraq, 2018

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How to cite this article: Kholoud Saeed Abbas, Adel Abed Amber, Huda Waleed, Sama Samer et al
Periodontal Disease And Type 2 Diabetics Versus Non diabetics In Adhamiyah Sector, Baghdad- Iraq, 2018.
Volume 22 | Number 3 | July-September 2022

Abstract

Background: periodontal disease is an inflammatory condition of the gums and the structures supporting the tooth (periodontium and alveolar bone), importance of diabetes mellitus type 2 and their effect on the periodontal disease and the need further study about this subject.

Objective: To compare the periodontal status of a group of diabetic patient with non-diabetic group.

Material and method: case control study, 105 type 2 diabetics and 105 non diabetic (mean age: 50.47±11.67) were examined in primary health center in AL-Adhamiyah sector, from the period 1 March 2018 until 1 July 2018, the periodontal parameters were recorded, the plaque index (PI), gingival index (GI), Periodontal pocket depth (PPD), clinical attachment level (CAL) and missing teeth these parameters were evaluated in a randomized half mouth examination.

Result: Diabetics highly significant in PI(p=0.0001), GI(p=0.0001), CAL(p=0.0001) , PPD(p=0.0001) and missing teeth(p=0.0001).

Conclusion: this study showed that diabetics had more severe and higher periodontal disease, diabetics and their health care givers should be informed of these findings so that diabetic patient can seek early management of periodontal disease.

Keywords: Diabetes mellitus, periodontal disease, plaque index, gingival index, calculus, periodontal pocket probing depth, clinical attachment level.

Introduction

Chronic periodontal disease (PD) is an inflammatory condition of the gums and the structures supporting the tooth (periodontium and alveolar bone), most often caused by anaerobic Gram-negative microorganisms, adhering to the teeth forming the bacterial plaque^(1,2).

Periodontal disease, particularly its mild and moderate forms, is extremely common in adult-aged populations all over the world, with prevalence rates of approximately 50%, while its severe form becomes

more common in the third and fourth decades of life, with global prevalence rates of around 10%⁽³⁾.

Severe periodontitis, the most common cause of tooth loss in adults, is frequently compounded by tooth drifting and hypermobility, finally leading to a collapsed biting function. Furthermore, periodontal disease and tooth loss are thought to be linked to a number of chronic diseases and ailments that impair overall health^(4,5).

Periodontal diseases include two major entities, gingivitis and periodontitis. Gingivitis

is characterized by reversible inflammation of periodontal tissues where as periodontitis also presents destruction of tooth supporting structures, and may lead to tooth loss. Existing evidence indicates that gingival inflammation (gingivitis) is required for periodontitis, however some gingivitis never transform to periodontitis^(3,4) This is because bacterial plaque accumulation is necessary for the onset of both entities but individual susceptibility is required to develop periodontitis^(4,5).

Periodontal diseases is a very prevalent condition. In the United States, over half the population aged 18 years or more have PD in its early stages, increasing to up to 75 % after the age of 35 years; its mild to moderate forms are present in 30% to 50%, and the severe generalized form in 5% to 15% of the general adult population⁽⁶⁾.

Diabetes mellitus (DM) is a chronic, non-communicable disease and also one of the major global public health issues. It is defined as a clinical syndrome characterized by hyperglycemia due to absolute or relative deficiency of insulin. An elevation of blood glucose level (hyperglycemia) is the primary feature of DM and results from a defect in insulin secretion by pancreatic β cells, a decrease in insulin sensitivity, or a combination of both⁽⁷⁾.

The most common form of DM is type 2 (DM2), which accounts for 85% of all diabetes patients⁽⁸⁾. Asia in particular has the highest prevalence of diabetes in the world. Countries exhibiting the fastest rate in diabetic population growth include India and China, among many other developing countries⁽⁹⁾. It is generally accepted that diabetes increases the prevalence and severity of periodontitis, and is now considered the sixth "opathy" of diabetes^(10,11).

In a large cross sectional study, White *et al.*, 2003 showed that The increased levels of periodontal attachment and bone loss seen in diabetic patients may be associated with the alterations in connective tissue metabolism that uncouple the receptive and formative responses. Impaired osseous healing and bone turnover in association with hyperglycemia⁽¹²⁾

The effect of periodontitis on diabetes may be related to the penetration of the host tissues by bacteria or their degradation products, such as lipopolysaccharides from the outer membranes (also called endotoxins or lipoglycans), into the systemic circulation⁽¹³⁾

As already mentioned, longitudinal studies have demonstrated a two-way relationship between diabetes and periodontitis, with more severe periodontal tissue destruction in diabetic patients and poorer glycemic control in diabetic subjects with periodontal disease^(14,15).

Aim of this study: To compare the periodontal status of type 2 diabetic group with non- diabetic group in primary health center in Adhamiyah sector .

Subject and methods: This was case-control study , included 105 patients who were diagnosed with type 2 DM and registered at "diabetic clinic and research institute in Adhamiyah sector in Baghdad and 105 non diabetic.) All the patients were cooperative and very well responded to the study. Out of these 210 patients, were males and 75 (35.7%) were females 135 (64.3%). The majority of patients belonged to AL-Sulikh primary health care center, however, some were also from AL-Dehalik primary health care center. All the patient in this study were diabetic patient type II which will have DM more than 1 year and above 35 years of age.

Self-designed and well-structured questionnaires were filled out by the researchers as the patients responded to these questions. The informed consent was taken from all the patients and they were also assured about their confidentiality. Also, permission from the head of the sector was also obtained to conduct this study. The study was conducted over a period of three months from (March-July) 2018. All the patients were very cooperative and responded well. The questionnaires contained several questions regarding the socio-demographic features (i.e. name, age, sex, and occupation, education status); medical history of diabetes (i.e. duration of diabetes, DM or not DM); periodontal status, their general and oral habits such as dental visits, frequency of brushing. For each patient, a complete examination of extra-oral and intra-oral full-mouth clinical parameters and the individual number of teeth present was performed.

The examinations and clinical measurements were done by four examiners, the following periodontal variables were recorded in a randomized half-mouth examination on four sites of each tooth (mesio-buccal, mid buccal, disto-buccal and mid-lingual). Plaque index (PI), gingival index (GI), calculus index (CL), periodontal probing depth (PPD), clinical attachment (CAL) were measured at mesial, distal, buccal and lingual aspects for each tooth.

The presence of plaque or debris (PI) was assessed according to the criteria described by Greene & Vermillion⁽¹⁶⁾.

0 = no

1 = plaque covering less than one third

2 = plaque covering between one and two thirds of buccal surface

3 = plaque covering greater than two third

The gingival index (GI) was assessed according to the criteria described by loe&silness.⁽¹⁷⁾

0 = normal (healthy gingiva); 1= mild inflammation - slight change in color, slight edema but no bleeding on probing; 2 = moderate inflammation - redness, edema and glazing, bleeding on probing; 3 = severe inflammation - marked redness and edema, ulceration with tendency to spontaneous bleeding

The presence of supra or sub gingival calculus or both was measured using a dental explorer and assessed according to the criteria described by Kunaal and Kharidhi⁽¹⁶⁾.

0: no ; 1 = calculus covering less than one third; 2 = calculus covering between one third to two third; 3 = calculus greater than two third

The periodontal probing depth (PPD) measurement were obtained by using a graduated periodontal prob.

The PPD was measured at 6 sites around each tooth (mesial, middle, and distal area & the facial & lingual surfaces). The greatest single measurement determines the pocket score for the tooth. It was measured from the free gingival margin (GM) to the bottom of the pocket.

The probe was maintained parallel to the long axis of the tooth at the mid-buccal and mid-lingual sites.

At the proximal sites the probe were placed as close to the contact point as possible and slightly angled to determine the apical most extent of the pocket and assessed according to the criteria of PPD was described by Williama⁽¹⁸⁾.

Mild = probing reveals sulcular depth not over 3 mm. (1-2mm attachment loss); Moderate = probing reveals pocket depth greater than 3 mm. but not over 5mm and Sever = probing reveals pocket depth greater than 5mm.

The clinical attachment level (CAL) was assessed at four sites around each tooth (the mesiobuccal, mid-buccal, mid-lingual and disto lingual).

The CAL was determined by measuring the distance from cemento-enamel junction (CEJ) to the pocket using a periodontal probe

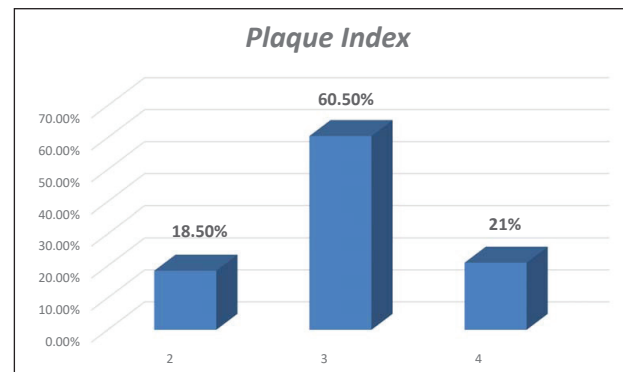
1 = the cej may be coronal to the gingival margin (gum recession); 2 = the cej may be at the same level as the gingiva margin); 3 = occasionally the gingival margin extend significantly over the cej

Statistical analysis

Data were analyzed with SPSS version 24 software .frequency distribution for selected variable was done first. All data arranged and tabulated in number and percentage. The statistical analysis tested by using P value less than 0.05 was consider significant .

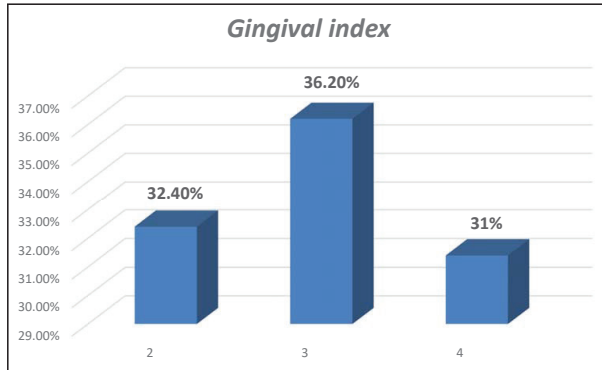
Result

Results in Fig 1 showed the plaque index in grade 2 point 3 which is covering between one to two third is more frequent than point 2 and point 4 is 127(60.50%)



Figure(1): PL index in grade 2 point 3 which is covering between one to two third of the buccal surface of the teeth is more frequent than point 2 and point 4 is 127(60.50%)

In Figure (2) the GI index in grade 2 point 3 which is moderate inflammation- redness, edema and glazing, bleeding on probing is more frequent than point 2 and point 4 is 76(36.20%).



Figure(2): GI index in grade 2 point 3 which is moderate inflammation- redness, edema and glazing, bleeding on probing is more frequent than point 2 and point 4 is 76(36.20%)

Results in figure (3) calculus index in grade 1 point 2 which is calculus covering less than one third of the teeth is more frequent than point 3 and point 4 is 105 (50.00%).

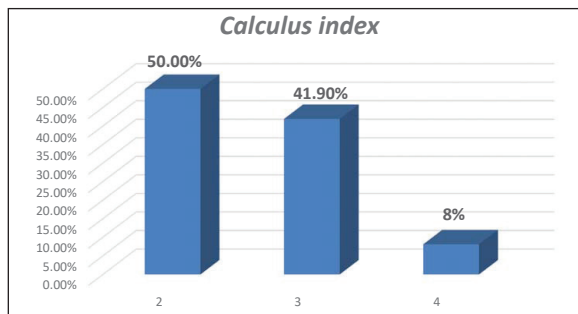


Fig 3: calculus index in grade 1 point 2 which is calculus covering less than one third of the teeth is more frequent than point 3 and point 4 is 105(50.00%)

In table 1 baseline characteristics of the 210 subjects included in the study are presented, the mean age of the participant was 50.47+/-11.67 years with age range from minimum 35-maximum 79 years old. There were 135(64.3%)female and 75(35.7%)male participants.113 participants(53.8%)worker and 97(46.2%)not worker.190 patient(90.5%)were illiterate and 20(9.5%) not illiterate.

There were 105(50%) diabetic patient whereas 105(50%) non diabetic patient. The mean duration of diabetes mellitus 7.4+/-5.5 years with arrange of minimum 1-maximum 23 years.

Table (1): Frequency distribution of the sample (n 210)

Variable	Frequency	%	
Gender	Male	75	35.7
	Female	135	64.3
Occupation	Working	113	53.8
	Not working	97	46.2
Level of education	Illiterate	190	90.5
	Not illiterate	20	9.5
Diabetes mellitus	Yes	105	50
	No	105	50
Plaque index	2	39	18.5
	3	127	60.5
	4	44	21
Gingival index	2	68	32.4
	3	76	36.2
	4	66	31.4
Calculus index	2	105	50
	3	88	41.9
	4	17	8.1
Periodontal pocket depth	Mild	168	80
	Moderate	39	18
	Severe	3	6
Clinical attachment level	1	55	26.2
	2	51	24.3
	3	104	49.5
Missing teeth	Yes	184	87.6
	No	26	12.4
Dental clinic visit for care	Yes	21	10
	No	189	90
Teeth brush	Yes	143	68.1
	No	67	31.9
Teeth brush per day	No brushing	67	31.9
	Once	70	33.3
	Twice	62	29.5
	Thrice	11	5.3
Age	(Mean 50.47± 11.67) (minimum 35 - maximum79)		
Duration of DM (years)	(Mean 7.4± 5.5) (minimum 1 - maximum23)		

Most of participants were female, most frequent age (35-79),105 diabetic, 105 non-diabetic and duration of DM (years) (minimum 1-maximum 23 years)

Results in table -2 showed the main association factors which have statistical significant with DM in 210 participate plaque index, gingival index, calculus index, periodontal pocket depth, clinical attachment level and missing teeth .

Table(2): Relationship between DM and indices (No.= 210)

Variable No.		Diabetic		Non diabetic		P value
		%	No.	%	No.	
Plaque index	2	7	17.9	32	82.1	<0.0001
	3	59	46.5	68	53.5	**
	4	39	88.6	5	11.4	
Gingival index	2	10	14.7	58	85.3	<0.0001
	3	43	56.6	33	43.4	**
	4	52	78.8	14	21.2	
Calculus index	2	38	36.2	67	63.8	<0.0001
	3	53	60.2	35	39.8	**
	4	14	82.4	3	17.6	
Periodontal pocket depth	Mild	67	39.9	101	60.1	<0.0001
	Moderate	36	92.3	3	7.7	**
	Severe	2	66.7	1	33.3	
Clinical attachment level	1	44	80	11	20	<0.0001
	2	32	62.7	19	37.3	**
	3	29	27.9	75	72.1	
Missing teeth	Yes	102	55.4	82	44.6	<0.0001
	No	3	11.5	23	88.5	**

The main association factors which have statistical highly significant with DM in 210 participate plaque index, gingival index, calculus index, periodontal pocket depth, clinical attachment level and missing teeth.

Discussion

In current study, there was a higher frequency of periodontitis in the measures of indices used, and shows the marked difference in the controlled and uncontrolled group of diabetic patients. This finding concurs with that of previous study done by Albert and Ward ⁽¹⁹⁾.

One study found no difference between diabetic non diabetic Ogunbodede, et. Al in Nigeria in 2005. ⁽²⁰⁾. However, this study used community periodontal index of treatment needs (CPITN) to asses periodontal health status. It is therefore difficult to compare our results with this study for we used different outcome measures to asses periodontal disease.

Another study reported only a slight association between periodontitis and diabetic ⁽²¹⁾.The slight difference was said to be because periodontitis in older subjects may approach similar levels of extent and severity regards less of whether they have diabetes. This agreement can be supported by the fact that there is usually a decline in periodontitis after the age of 50-60 years ⁽²²⁾. This is because at this age most of the teeth affected by periodontal destruction have already been extracted.

Current study consisted of adults aged 35 years or older. It is in this age group that both chronic periodontitis and type 2 diabetes start to manifest Tsai, et. Al in US in 2002⁽²³⁾.Therefore, it unlikely that the more sever periodontitis in our study group was due to other manifestation of systemic diseases other than type 2 diabetes.

Results in figure 1 showed that the average percentages of sits with plaque covering between one and two thirds of buccal surface of the teeth, figure 2 showed the average percentage of sits withgingivitis moderate inflammation- redness, edema and glazing, bleeding on probing figure 3 showed that the average percentage of sits with calculuscovering less than one third of the teeth, This means that our study groups had poor plaque control, The poor plaque control contributed to a high prevalence of gingivitis and this lead to accumulation more of calculus. Therefore, plaque, the primary etiologic factor of periodontal disease.

In this study the PPD,CAL, and GI indices were significantly higher (p=0.0001) in diabetics compared to control, these parameters are the main determinant measures of periodontal diseases, it implies that diabetics in this study suffered from more advanced periodontal diseases than control. This is consistent with the findings of other studies by Kapellas *etal.*, in Australian in 2008, person *etal.*, in 2003, Metu *etal.*,in 2009 ^(24,25,26).

Also in this study plaque and calculus indices were significantly higher (p=0.0001) in DM compared to control group, it is suggested that the probable reason for accumulation of more plaque in uncontrolled diabetic patients could be poor self-efficacy, resulting in less effective cleaning and the increase of level of glucose in gingival crevicular fluid (GCF) and saliva per se could be another possibility leading to higher accumulation of plaque and calculus by Evanthia *etal.*, 2006; Novak *etal.*, in America in 2008 and Mei *etal.*,2020^(27,28,29).

Missing teeth was significant higher ($p=0.0001$) in DM compared to control group, similar to a comparative SAUDI study by Almas, et. Al in 2001.⁽³⁰⁾ And another study by Ofoego *et al.*, in 2013⁽³¹⁾ Since advanced periodontal diseases ultimately leads to teeth loss. Lesser number of teeth in diabetics than controlled is expected to find.

Conclusion

Improper oral hygiene has a strong negative impact on periodontal health, which is evident by increased scores on indices scale of gingival, periodontal, plaque and calculus which leads to teeth loss.

Ethical clearance: Permission from primary health center in Adhamiyah sector was attained

before starting the study. All the participants gave verbal consent with confidentiality of participants' identification

Conflict of interest: Nil

Source of funding: Nil

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Effect Study of Physiological changes of a Pregnant Woman

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How to cite this article: Intiesar Younis Mohammed Ibrahim et al ffect Study of Physiological changes of a Pregnant Woman Volume 22 | Number 3 | July-September 2022

Abstract

Understating these changes and their profound impact on the pharmacokinetic properties of drugs in pregnancy is essential to optimize maternal and fetal health. During normal pregnancy, the renin-angiotensin system (RAS) plays a vitally important role in salt balance and subsequent well-being of mother and fetus. In this balance, one must consider not only the classical renal RAS but also that of the uteroplacental unit, where both maternal and fetal tissues contribute to the signaling cascade. Many studies have shown that in normal pregnancy there is an increase in almost all of the components of the RAS. In derangements of pregnancy this delicate equilibrium can become unbalanced. Preeclampsia is one such case. It is a disorder of pregnancy characterized by hypertension, proteinuria and placental abnormalities associated with shallow trophoblast invasion and impaired spiral artery remodeling. Changes in the cardiovascular system in pregnancy are profound and begin early in pregnancy, such that by eight weeks' gestation, the cardiac output has already increased by 20%. The primary event is probably peripheral vasodilatation. This is mediated by endothelium-dependent factors, including nitric oxide synthesis, upregulated by oestradiol and possibly vasodilatory prostaglandins (PGI₂). There is a significant increase in oxygen demand during normal pregnancy. This is due to a 15% increase in the metabolic rate and a 20% increased consumption of oxygen.

Keywords: Pharmacokinetic, vasodilatory, consumption, upregulated, proteinuria.

Introduction

Physiologic changes in pregnancy induce profound alterations to the pharmacokinetic properties of many medications. These changes affect distribution, absorption, metabolism, and excretion of drugs, and thus may impact their pharmacodynamic properties during pregnancy. Pregnant women undergo several adaptations in many organ systems. Some adaptations are secondary to hormonal changes in pregnancy, while others occur to support the gravid woman and her developing fetus. Some of the changes in maternal physiology during pregnancy include, for example, increased maternal fat and total body water, decreased plasma protein concentrations, especially albumin, increased maternal blood volume, cardiac output, and blood flow to the kidneys and uteroplacental unit, and decreased blood pressure. The maternal blood volume expansion occurs at a larger proportion than the increase in red blood

cell mass, which results in physiologic anemia and hemodilution. Other physiologic changes include increased tidal volume, partially compensated respiratory alkalosis, delayed gastric emptying and gastrointestinal motility, and altered activity of hepatic drug metabolizing enzymes. Understating these changes and their profound impact on the pharmacokinetic properties of drugs in pregnancy is essential to optimize maternal and fetal health.^[1]

1- Renal System

During normal pregnancy, the renin-angiotensin system (RAS) plays a vitally important role in salt balance and subsequent well-being of mother and fetus. In this balance, one must consider not only the classical renal RAS but also that of the uteroplacental unit, where both maternal and fetal tissues contribute to the signaling cascade. Many studies have shown

that in normal pregnancy there is an increase in almost all of the components of the RAS. In derangements of pregnancy this delicate equilibrium can become unbalanced. Preeclampsia is one such case. It is a disorder of pregnancy characterized by hypertension, proteinuria and placental abnormalities associated with shallow trophoblast invasion and impaired spiral artery remodeling. Despite being a leading cause of maternal death and a major contributor to maternal and perinatal morbidity, the mechanisms responsible for the pathogenesis of preeclampsia are poorly understood. Immunological mechanisms and the RAS have been long considered to be involved in the development of preeclampsia. Numerous recent studies demonstrate the presence of the angiotensin II type I receptor agonistic autoantibody (AT₁-AA). This autoantibody can induce many key features of the disorder and upregulate molecules involved in the pathogenesis of preeclampsia. Here we review the functional role of the RAS during pregnancy and the impact of AT₁-AA on preeclampsia.^[2]

The kidneys are also mainly involved in water and sodium osmoregulation. Vasodilatory prostaglandins, atrial natriuretic factor, and progesterone favor natriuresis; whereas aldosterone and estrogen favor sodium retention. Although elevated GFR leads to additional sodium wasting, the higher level of aldosterone, which reabsorbs sodium in the distal nephron, offsets this wasting. The resulting outcome is one of significant water and sodium retention during pregnancy, leading to cumulative retention of almost a gram of sodium, and a hefty increase in total body water by 6–8 l including up to 1.5 l in plasma volume and 3.5 l in the fetus, placenta, and amniotic fluid. This “dilutional effect” leads to mildly reduced serum sodium (concentration of 135–138 meq/L compared with 135–145 meq/L in non-pregnant women) as well as serum osmolarity (normal value in pregnancy ~280 mOsm/L compared with 286–289 mOsm/L in non-pregnant women). Another consequence of this volume expansion is reduced in peak serum concentrations (C_{max}) of many hydrophilic drugs, particularly if the drug has a relatively small volume of distribution.^[3]

2 - cardiovascular system

Changes in the cardiovascular system in pregnancy are profound and begin early in pregnancy, such that by eight weeks’ gestation, the cardiac output has already increased by 20%. The primary event is

probably peripheral vasodilatation. This is mediated by endothelium-dependent factors, including nitric oxide synthesis, upregulated by oestradiol and possibly vasodilatory prostaglandins (PGI₂). Peripheral vasodilation leads to a 25–30% fall in systemic vascular resistance, and to compensate for this, cardiac output increases by around 40% during pregnancy. This is achieved predominantly via an increase in stroke volume, but also to a lesser extent, an increase in heart rate. The maximum cardiac output is found at about 20–28 weeks’ gestation. There is a minimal fall at term.^[4]

Reduced cardiac output is associated with a reduction in uterine blood flow and therefore in placental perfusion, which could compromise the foetus.^[5]

Pulmonary vascular resistance (PVR), like systemic vascular resistance (SVR), decreases significantly in normal pregnancy. Although there is no increase in pulmonary capillary wedge pressure (PCWP), serum colloid osmotic pressure is reduced by 10–15%. The colloid osmotic pressure/pulmonary capillary wedge pressure gradient is reduced by about 30%, making pregnant women particularly susceptible to pulmonary oedema. Pulmonary oedema will be precipitated if there is either an increase in cardiac pre-load (such as infusion of fluids) or increased pulmonary capillary permeability (such as in preeclampsia) or both.^[6]

Labour is associated with further increases in cardiac output (15% in the first stage and 50% in the second stage). Uterine contractions lead to an auto-transfusion of 300–500 ml of blood back into the circulation and the sympathetic response to pain and anxiety further elevate the heart rate and blood pressure.

Cardiac output increases by 60–80%, followed by a rapid decline to pre-labour values within about one hour of delivery. Transfer of fluid from the extravascular space increases venous return and stroke volume further.^[7]

The above physiological changes lead to changes on cardiovascular examination that may be misinterpreted as pathological by those unfamiliar with pregnancy. Changes may include a bounding or collapsing pulse and an ejection systolic murmur, present in over 90% of pregnant women. The murmur may be loud and audible all over the precordium, with

the first heart sound loud and possibly sometimes a third heart sound. There may be ectopic beats and peripheral oedema.^[8]

Normal findings on ECG in pregnancy that may partly relate to changes in the position of the heart include:

- atrial and ventricular ectopics
- Q wave (small) and inverted T wave in lead III
- ST-segment depression and T-wave inversion in the inferior and lateral leads
- left-axis shift of QRS.

3 - Respiratory System

There is a significant increase in oxygen demand during normal pregnancy. This is due to a 15% increase in the metabolic rate and a 20% increased consumption of oxygen. There is a 40-50% increase in minute ventilation, mostly due to an increase in tidal volume, rather than in the respiratory rate. This maternal hyperventilation causes arterial pO₂ to increase and arterial pCO₂ to fall, with a compensatory fall in serum bicarbonate to 18-22 mmol/l (see Table 1). A mild fully compensated respiratory alkalosis is therefore normal in pregnancy (arterial pH 7.44).^[9]

Table 1

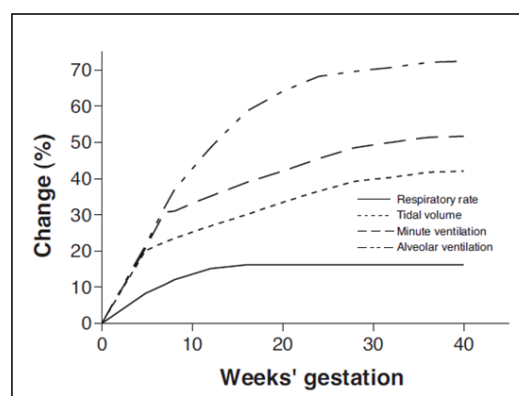
1. Reference ranges for respiratory function in pregnancy

Investigations	Normal values	
	Pregnant	Non-pregnant
pH	7.40-7.47	7.35-7.45
pCO ₂ , mmHg (kPa)	≤ 30 (3.6-4.3)	35-40 (4.7-6.0)
pO ₂ , mmHg (kPa)	100-104 (12.6-14.0)	90-100 (10.6-14.0)
Base excess	No change	+2 to -2
Bicarbonate (mmol/l)	18-22	20-28

Changes in the respiratory system may be categorised as anatomical and physiological. Anatomical changes include capillary engorgement and oedema of the upper airway down to the pharynx, false cords, glottis and arytenoids. These changes are important to the anaesthetist as oedema in the air

way makes upper airway obstruction and bleeding more likely during mask anaesthesia and may make tracheal intubation more difficult. A smaller diameter endotracheal tube may be required. The

diaphragm is progressively displaced cranially by the gravid uterus. An increase in the diameter of the chest ensures that minute ventilation rises during pregnancy. However, diaphragmatic movement is reduced in late pregnancy, particularly in the supine position. Reports in the literature suggest failure to intubate the trachea is 7 times more common in the term parturient compared to non-pregnant patients. The reduced functional residual capacity causes airway closure in 50% of parturients at term in the supine position. Thus, pre-oxygenation is less effective in the term parturient and desaturation is likely to occur much faster than in the non-pregnant patient. Pre-oxygenation period of 3-5 min is the standard recommendation.^[10]



The increases in respiratory rate and tidal volumes result in increases in both alveolar and minute ventilation. Consequently, there is a fall in PaCO₂ that plateaus at 4.1 kPa by the end of the first trimester. PaO₂ rises to 14 kPa during the third trimester but then falls to < 13.5 kPa at term because increased oxygen consumption is no longer fully compensated for by the rise in cardiac output. Thus, the alveolar oxygen gradient increases. In some parturients, this may be worsened by aortocaval compression and closure of dependent airways. At term, oxygen consumption and carbon dioxide production are increased by 60% above non-pregnant values.^[11]

4 - Changes in the Ocular System

Pregnancy is often associated with ocular changes which may be more commonly transient but occasionally, permanent. The ocular effects of pregnancy may be physiological or pathological or may be modifications of pre-existing conditions. Physiological changes include increased pigmentation around the cheeks, ptosis, changes in

cornea and refractive status, decreased intraocular pressure. These usually resolve post partum. Pre-existing diseases such as Graves' disease, Retinitis pigmentosa, Optic neuritis, should be monitored due to their remission or relapses in pregnancy. There may be worsening of Diabetic retinopathy, and Central serous chorio-retinopathy with increased risk of Retinal detachment. Conditions like Glaucoma and Non infectious uveal inflammatory disorders may even improve transiently. Pre-eclampsia and eclampsia could result in hypertensive retinopathy, exudative retinal detachment and cortical blindness. Neuro-ophthalmological disorders such as venous sinus thrombosis, benign intracranial hypertension, pituitary adenoma, meningioma and optic neuritis should be kept in mind as differential diagnosis in pregnant women presenting with visual acuity loss, visual field loss, persistent headaches or oculomotor palsies. Use of ophthalmic drugs can affect fetal health during pregnancy.^[12]

Intraocular pressure has been shown to decrease during pregnancy; this is related to (1) increased progesterone levels, (2) the presence of relaxin, and (3) decreased production of aqueous humor due to increased secretion of human chorionic gonadotropin. Changes in intraocular pressure in parturients may produce visual disturbances as well as contact lens intolerance.^[13]

5 - Changes in the Gastrointestinal System

The enlarging uterus displaces and disrupts the lower esophageal sphincter, and progesterone relaxes this high pressure zone, causing a progressive increase in the incidence of heartburn (up to 80% at term). An increase in gastric pressure due to mechanical compression also contributes to heartburn. Despite the prevalence of this symptom, total acid production is decreased (although placental production of gastrin increases the total concentration of this hormone). Opioids administered by any route will further increase the gastric emptying time. Studies demonstrate solid food in the stomachs of laboring women even after 18 h of fasting. Gastric emptying remains abnormal on the first postpartum day but returns to normal on the second day. Hepatic transaminases, bilirubin, and LDH are increased slightly in pregnancy. Alkaline phosphatase is markedly increased (2-4 fold), but due to placental production, not hepatic changes. Serum cholinesterase activity is reduced 24% before delivery

and reaches a nadir (33% reduction) on the third postpartum day (Fig. 1-3). Approximately 11% of post^[14]

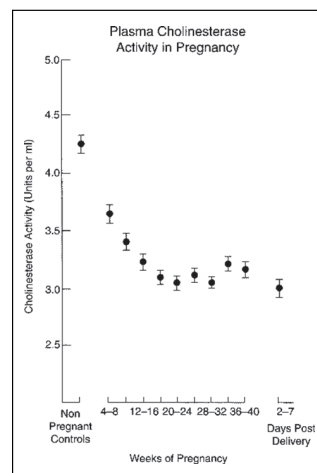


Figure. Plasma cholinesterase activity in pregnancy. (From Cohen.18 Used with permission from Elsevier.) partum women exhibit clinically deficient activity, manifest as an exaggerated response to normal doses of succinylcholine.^[15]

Even with this lower activity, normal dosing of succinylcholine for intubation is recommended when general anesthesia is required, though use of a peripheral nerve stimulator seems prudent.

Gallbladder function and emptying are impaired during pregnancy, and there is evidence that pregnant women may be more prone to gallstones.^[16]

6 - Changes in the Central and Peripheral Nervous Systems

The central and peripheral nervous systems undergo significant changes during pregnancy. MAC is decreased by 25-40% during pregnancy. Increased progesterone and endorphin concentrations during pregnancy have been implicated as a cause of this change. However, a few studies have shown that endorphin concentrations do not increase until the onset of active labor,²¹ so this cannot explain early decreases in MAC. By injecting exogenous progesterone in oophorectomized rabbits, a decrease in MAC was observed when compared with control animals. The factors suggested were compensated respiratory alkalosis of pregnancy, reduced plasma and cerebrospinal fluid (CSF) protein levels during pregnancy, leading to increased free local anesthetic, and pregnancy hormones. The latter

is the most likely explanation, based on animal studies. An increased sensitivity to bupivacaine in isolated nerve fibers has been demonstrated.^[17] It is possible that progesterone or one of its active metabolites is responsible for the observed increased sensitivity of the peripheral nervous system to anesthetics in parturients. This increased sensitivity was also observed in nerves from oophorectomized rabbits treated chronically with exogenous progesterone. Interestingly, this phenomenon was not observed following acute exposure to progesterone. In humans, enhanced sensitivity of peripheral nerves to local anesthetic has also been documented.^[18]

7 - Hematologic and Coagulation Systems

White (WBC) and red blood cell (RBC) counts increase during pregnancy. The first is thought to be secondary to bone marrow granulopoiesis; whereas the 30% increase in RBC mass (250–450 mL) is mainly driven by the increase in erythropoietin production. The higher WBC count can sometimes make diagnosis of infection challenging; however normally the increase in WBC is not associated with significant increase in bands or other immature WBC forms^[19]. Despite the increase in RBC mass, and as previously described, plasma volume increases significantly much higher (~45%), which leads to “physiologic anemia” of pregnancy. Anemia usually peaks early in the third trimester (30–32 weeks) and may become clinically significant in patients already anemic (iron deficiency, thalassemia, etc.) at entry to pregnancy^[20]. This physiologic hemodilution may provide survival advantage to women during pregnancy and childbirth, since the less viscous blood improves uterine and intervillous perfusion, while the increased red cell mass, coupled with increased uterine blood flow, optimizes oxygen transport to the fetus, and at the same time the blood lost during delivery will be more dilute^[21]. The increase in RBC mass is accompanied by increased maternal demand of iron by an additional 500 mg during pregnancy. This is coupled with an additional 300 mg of iron that is transferred to the fetus and 200 mg that is required for normal daily iron losses, making the total iron requirement in pregnancy around 1 g^[22].

Pregnancy is a hypercoagulable state secondary to blood stasis as well as changes in the coagulation and fibrinolytic pathway such as increased plasma levels

of clotting factors (VII, VIII, IX, X, XII), fibrinogen, and von Willebrand factor. Fibrinogen increases starting in the first trimester and peaks during the third trimester in anticipation of delivery. Prothrombin and factor V levels remain the same during pregnancy. Whereas, protein S decreases in pregnancy, protein C does not usually change and thus can be assayed if needed in pregnancy. Free antigen levels of the protein S above 30% in the second trimester and 24% in the third trimester are considered normal during pregnancy^[23]. Anti-thrombin III levels do not change, however, plasminogen activator levels are decreased and those of plasminogen activator inhibitor (PAI-1) levels increased by 2–3 fold, leading to suppressed fibrinolytic state in pregnancy. Platelet function and routine coagulation screen panels remain normal. This hypercoagulable state may offer a survival advantage by minimizing blood loss after delivery, but it also predisposes pregnant women to higher risks for thromboembolism^[24].

Conflict of interest: There is no conflict of interest among the authors.

Funding: Self

Ethical Clearance: This study is ethically approved by the Institutional ethical Committee.

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Hypoxic Brain Changes in Victims Who Died Due to Hanging- An Autopsy Based Study

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How to cite this article: S. Harish, K Sasikala, K.S. Meena, A. Sarath et al Hypoxic Brain Changes in Victims Who Died Due to Hanging - An Autopsy Based Study. Volume 22 | Number 3 | July-September 2022

Abstract

Survival after attempted hanging is a rare event. Many patients who suffer from hypoxic brain damage following hanging die immediately. The study was conducted in the Department of Forensic Medicine, Government Medical College, Thiruvananthapuram during the period January 2013 to June 2014. 50 cases were included in the study. Among the 50 cases, 25 cases were the hanging cases that survived for varying periods before death and 25 cases were from the non-survived victims of hanging. Macroscopic and microscopic changes in the brain, were compared to find out the changes resulting from hypoxic insult. The cases were studied in detail and are described below.

Keywords: Hanging, Hypoxic brain changes, Survival after hanging

Introduction

Hanging is an easy and highly effective method of committing suicide with a high mortality rate. According to World Health Organization, hanging was the predominant method of suicide in 56 countries included in their analysis¹. As per Indian National crime records bureau report of 2012, it had been found that death by hanging was 37% in 2012². The departmental statistics of the Department of Forensic Medicine, State Medico-legal institute of Kerala, Government Medical College, Thiruvananthapuram for the past 6 years (from 2007 to 2012) had shown

that around 22 to 29% of deaths among the total medico-legal postmortems conducted per year were due to hanging. 15 to 16% of cases of total hanging cases were brought down alive during hanging but died before getting any treatment and only 1 to 2% survived to reach a hospital. Hence survival after hanging is a rare event. A long survival and recovery is rarer.

The present study was an attempt to compare the macroscopic and microscopic changes in the brain of non-survived victims and victims who survived for variable periods before death.

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Materials and Methods

The study was conducted in the Department of Forensic Medicine, Government Medical College, Thiruvananthapuram during the period January 2013 to June 2014. 50 cases were included in the study. Victims of both sexes were included in the study and their age range was between 13 and 88 years. Cases were divided into two groups. Group I included 25 cases of non-survived victims of hanging Group II consisted of 25 cases of hanging that survived for varying periods before death. History and other details were collected from the police officer in charge of the concerned dead body, accompanying near relative and from clinical case records. Dissections were carried out by Modified Rokitansky procedure. During autopsy, the macroscopic appearances of the brain was recorded in the proforma. Bits of tissues were taken from brain (from regions of hippocampus, basal ganglia, midbrain and cerebellum using a sharp knife. Tissues were fixed in 10% formalin, processed and stained with Harris Hematoxylin and Eosin stains. The slides were labeled according to serial number. Microscopic examination of each slide was done in various powers and the details were noted in the proforma. Gross and histological findings of brain were compared and data were analysed using SPSS (Statistical Package for Social Sciences) version 16.

Observations And Results

Macroscopic And Microscopic Findings In The Brain

A. Macroscopic Appearances

1. Weight Of Brain

Weight of the brain was recorded in all cases. In Group I (non-survived group), the maximum weight of brain was 1300g, minimum weight was 1100 g and mean weight was 1188g with a standard deviation of 58g. The maximum weight of brain in Group II (survived group) was 1300 g and minimum weight was 1100 g. The mean weight of the brain was 1206 g with a standard deviation of 58 g.

2. Congestion And Edema

Congestion and edema of the brain were seen in all the cases of Group I (non-survived group) and II (survived group)

3. Sub Arachnoid Hemorrhage

Subarachnoid hemorrhage was present in only one case of Group II (survived group) who survived for more than 12 hours. This finding was not seen in all other cases of Group II (survived group) and Group I (non-survived group)

4. Softening of Hippocampus, Basal Ganglia and Cerebellum

Softening of hippocampus, basal ganglia and cerebellum were present in 52% of cases in Group II (survived group) victims who had survived for more than 12 hours. It was absent in other cases in Group II (survived group) and all cases in Group I.

B. Microscopic Appearances

Microscopic examination of the brain tissue from hippocampus, basal ganglia, brain stem and cerebellum were studied.

1. Congestion and Edema

Congestion and edema of hippocampus, basal ganglia and brain stem were seen in all cases of Group I and II. (non-survived and survived groups)

2. Red Neurons

Red neurons in the hippocampus were present in the 40% of cases in Group II (survived group) who had a survival period of more than 12 hours and it was not seen in the remaining 60% cases of Group II (survived group) and all cases of Group I (non-survived group).

Red neurons in the basal ganglia were present in 32% of cases in Group II (survived group) who had survived for more than 24 hours.

3. Vacuoles in Neuronal Cytoplasm

Vacuoles in the neuronal cytoplasm of hippocampus was present in one case of Group II (survived group) who had survived for a period of less than one hour. It was absent in the remaining cases of Group II (survived group) and all cases of Group I (non-survived group)

4. Karyolysis of Purkinje Cells of Cerebellum

Karyolysis of Purkinje cells of cerebellum was present only in one case of Group II (survived group) who had survived for more than 24 hours. This finding was absent in the remaining cases of Group II (survived group) and all cases of Group I (non-survived group).

Macroscopic Changes in the Brain with Progression of Survival Time

Table 1: Macroscopic changes in the brain with progression of survival time

Period of Survival	No	Congestion	Edema	Softening of Hippocampus Basal ganglia Cerebellum	Subarachnoid Hemorrhage
Less than 1 hour	4	4	4		
1-3 hours	5	5	5		
3-6 hours	3	3	3		
6-12 hours	1	1	1	1	
12-24 hours	4	4	4	4	1
1-2 days	1	1	1	1	
2-3 days	1	1	1	1	
3-7 days	5	5	5	5	
7-12 days	1	1	1	1	

Microscopic Changes in the Brain With Progression of Survival Time

Table 2: Microscopic changes in the brain with progression of survival time

Period of survival	No	Congestion			Edema			Red neurons		Vacuole	Karyolysis
		HC	BG	BS	HC	BG	BS	HC	BG	HC	Cerebellum
Less than 1 hour	4	4	4	4	4	4	4			1	
1-3 hours	5	5	5	5	5	5	5				
3-6 hours	3	3	3	3	3	3	3				
6-12 hours	1	1	1	1	1	1	1				
12-24 hours	4	4	4	4	4	4	4	2			
1-2 days	1	1	1	1	1	1	1	1	1		1
2-3 days	1	1	1	1	1	1	1	1	1		
3-7 days	5	5	5	5	5	5	5	5	5		
7-12days	1	1	1	1	1	1	1	1	1		

Histopathological findings found significant in bivariate analysis

Period of survival and microscopic findings in the brain, heart and lungs were studied using Chi Square test with n-1 degrees of freedom. Softening of hippocampus, basal ganglia and cerebellum and the presence of red neurons in the hippocampus and basal ganglia has a significant relationship with period of survival. These findings are commonly seen in the victims who survived for a long time. These findings were either absent or present in a small group in the non-survived group.

Table 3: Histopathological findings in brain found significant in bivariate analysis

Factors	Category	Group I (non-survived group) n=25	Group II (survived group) n=25	P value
Softening of hippocampus, basal ganglia and cerebellum	Present	0	13	<0.001
	Absent	25	12	
Red neurons in hippocampus	Present	0	10	<0.001
	Absent	25	15	
Red neurons in basal ganglia	Present	0	8	0.002
	Absent	25	17	

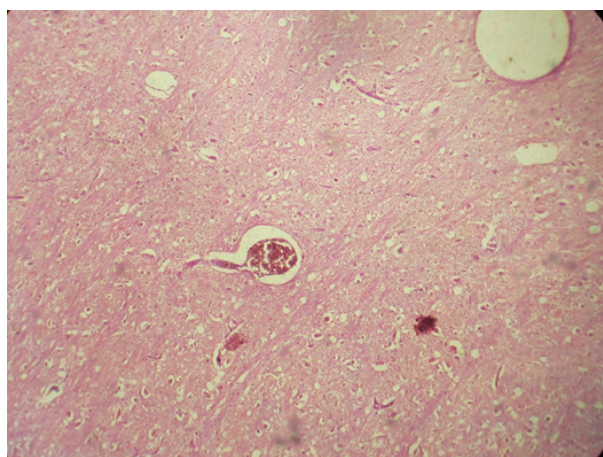


Fig 1: Congestion and edema in hippocampus H&E, x 100

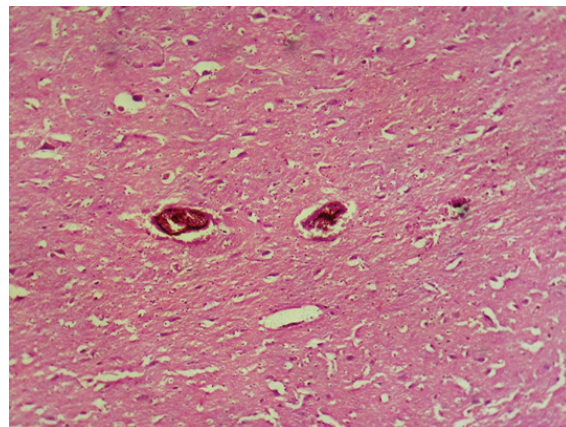


Fig 2: Congestion and edema in basal ganglia, H&E x100

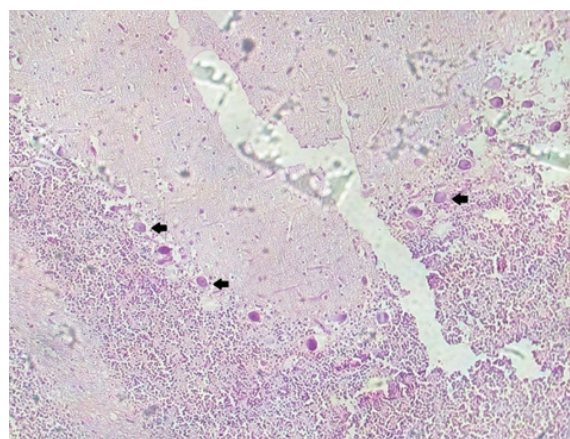


Fig 3: Red neurons in hippocampus H&E x 400

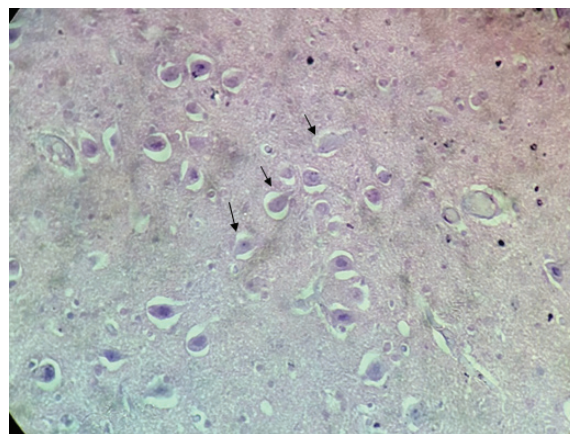


Fig 4: Karyolysis of Purkinje cells of cerebellum H&E x 400

Discussion

Macroscopic And Microscopic Findings in Brain

a. Macroscopic appearances

1. **Congestion** of the brain was seen in all the cases of Group I (non-survived group) and II (survived group) macroscopically. Microscopically congestion was seen in all the regions. Congestion has been described as a cardinal feature of asphyxia. Congestion of brain as a macroscopic autopsy finding in non-survived victims of hanging have been described by various authors^{3,4,5,6} and according to them, congestion occurs due to compression of jugular venous system where the carotid flow remains intact. In Group II (survived group), congestion of the brain was a constant finding from less than one hour survival period to 12 days of survival. This was one of the first changes noted in the present study in both groups. Hence congestion could have been the first change in the brain which occurs following cerebral venous congestion.
2. **Brain edema** was another finding seen in all the cases of Group I (non-survived group) and II (survived group) macroscopically and could be demonstrated microscopically. Brain edema had not been described by any of the studies in non-survived victims of hanging. In Group II (survived group), edema of the brain was a constant finding from less than one hour survival period to 12 days of survival. According to one author, cerebral edema becomes apparent both clinically and histologically only 1 to 4 hours after severe hypoxic insult, however in the present study it was seen in victims who survived for less than one-hour also⁷. Brain edema in attempted hanging and strangulation victims had been described by various authors^{8,9,10,11,12}. In another study of CT brain imaging done in 43 cases of attempted hanging reported brain edema in 32%.¹³ But brain edema was seen in all cases of the present study. Hence, we could assume that when there is congestion, edema will follow.
3. **Softening of hippocampus, basal ganglia and cerebellum** were present in 52% of cases in Group II (survived group). This was seen in victims who survived at least for 6 hours up to 12 days.

Scalloped pattern of cortex at places, and atrophy of cerebellar folia following hypoxic insult has been described⁶. This might have been consistent with softening appreciated in the areas of brain in the present study. Certain areas of the brain are selectively vulnerable to hypoxia like the hippocampus, basal ganglia and cerebellum¹⁴. Though they had described characteristic microscopic changes in these areas, they had not mentioned any macroscopic changes, however softening of hippocampus, basal ganglia and cerebellum noted was in the present study.

4. **Subarachnoid hemorrhage** was present in only one case of Group II (survived group) who had a survival period of 12 to 24 hours. Subarachnoid effusions are common in hanging victims according to Reddy, however the author has not mentioned sub arachnoid hemorrhage specifically¹⁵.

b. Other microscopic appearances

1. **Red neuron** is a neuron which becomes shrunken, its triangular shape intensified, its nucleus becomes pyknotic, and its cytoplasm takes on abnormal intense eosinophilic staining property following hypoxic insult. Such types of neurons were present in the hippocampus and basal ganglia of victims of hanging who survived for varying periods before death (Group II (survived group)). They were seen in the hippocampus of 40% of cases who had a survival period of more than 12 hours and in the basal ganglia of 32% of cases who had survived more than 24 hours. Red neurons were seen in the hippocampus from 12 hours to 12 days of survival. Among the four cases who survived for 12 to 24 hours only two cases had showed red neurons but from 24 to 48 hours of survival, all cases had shown the finding. Red neurons were seen in the basal ganglia in all cases who survived for more than 24 hours. Such neurons were not seen in the midbrain or cerebellum. Red neurons first appear 12 to 24 hours after the hypoxic insult¹⁶. This is in agreement with the present study. Red neurons were not seen in the non-survived victims but could be seen in the survived victims beyond 12 hours of survival. Its appearance is directly proportional to survival time.

2. **Vacuoles in neuronal cytoplasm** of hippocampus were present in only one case of Group II (survived group) who had a survival period of less than one hour. Vacuoles which are seen in the cytoplasm of neurons occur due to autolytic changes and therefore they should be considered as an insignificant finding¹⁴.
3. **Karyolysis of Purkinje cells** of cerebellum was present only in one case of Group II (survived group) who had survived for 24 to 36 hours. Purkinje cells of the cerebellum are selectively vulnerable to hypoxia¹⁴. Purkinje cells shows a homogenising cell change, the cytoplasm becomes progressively paler and homogenous and nucleus becomes smaller.^{14,17} The findings in the present study are in agreement with the above-mentioned studies. Atrophy of cerebral cortex seen on autopsy has been described.⁶ Early reactive changes are seen in the microglia and endothelial cells when the person survives for more than 24 hours^{14,17}.

Conclusion

The study was conducted in the Department of Forensic Medicine, Government Medical College, Thiruvananthapuram during the period January 2013 to June 2014. Fifty cases were included in the study, twenty-five cases were from the non-survived victims of hanging (Grouped as I) and twenty five cases were from the hanging cases that survived for varying periods before death (Grouped as II). The following findings were observed

Congestion had been described as a cardinal sign of asphyxia. Congestion of the brain was seen in all the cases of both non survived and survived groups macroscopically and microscopically. Brain edema was another finding seen in all the cases of Group I and II macroscopically and could be demonstrated microscopically. We could assume that when there is an association between congestion and brain edema. When there is congestion, of brain, edema also could be there. Softening of hippocampus, basal ganglia and cerebellum were present in 52% of cases in Survived group. This was seen in victims who survived at least for 6 hours and upto 12 days. This change was seen with progression of survival time. This might have been due to the hypoxia persisting

with diminished perfusion. This finding was not seen in the non-survived group. Red neurons were seen in the hippocampus of cases who had a survival period of more than 12 hours and in the basal ganglia of cases who had survived more than 24 hours. Red neurons were not seen in the non-survived victims. Its appearance is directly proportional to survival time. Karyolysis of Purkinje cells of cerebellum were present only in one case of survived group who had a survival period more than 24 hours. This might have been due to the selective vulnerability of cerebellum to hypoxic insult.

Survival after attempted hanging is a rare event. Many patients who suffer from hypoxic brain damage following hanging die immediately. Histopathological examination of bits of tissue from the hippocampus, basal ganglia, brain stem, cerebellum, should suffice to establish that the victim has experienced an episode of hypoxia sufficiently severe to produce wide spread damage to this brain. This study has established that hanging produces hypoxic damage to the the brain.

Conflict of Interest: We hereby declare that there is no conflict of interest

Source of Funding: Self

Ethical Clearance: Ethical Clearance Had Been Obtained From Institutional Ethical Committee Of Government Medical College, Thiruvananthapuram.

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Suicide Among Adolescents: A Medico-legal Study at Tertiary Care Centre of Western Maharashtra, India

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How to cite this article: S.S.Vidhate, N.P. Zanjad et al Suicide Among Adolescents: A Medico-legal Study at Tertiary Care Centre of Western Maharashtra, India. Volume 22 | Number 3 | July-September 2022

Abstract

Globally, suicide is the second leading cause of mortality among young people and is an important public health problem. The main aim of the study is to identify the pattern of suicide among adolescent age group and to suggest preventive methods. This is a retrospective autopsy-based study from 01 June 2018 to 31 May 2019 conducted at the Department of Forensic Medicine, B. J. Government Medical College, Pune, Maharashtra, India. Total 84 cases of suicidal death among adolescent (11 to 19 years) were recorded during the study period. Maximum number of cases (52.38 %) was observed in late adolescent age group (18-19 years) with Female predominance (70.23 %) with F:M ratio was 2.45:1. Hanging (79.76 %) was the most common method used for committing suicide and maximum adolescent (73.80%) preferred their own residence for committing suicide. Love affair was observed as most common precipitating factor for committing suicide (42.85 %) and other precipitating factors were quarrel between parents, depression and addiction, school related problems, sex related problems, one sided love. The paper discussed different preventive methods, specific to adolescent age so as to help in identifying vulnerable adolescent.

Keywords: Adolescent, Suicide, Hanging, Manner of death.

Introduction

Suicide and attempted suicide are commonly encountered in medico-legal practice. Globally suicide is the most common problem and according WHO, suicide in youth and adolescent is the second most common cause of death⁽¹⁾. Suicide rates differ by age, sex, family problems, social problems, decess, addictions. Adolescents and young adult youth is a period of heightened risk of suicide⁽²⁾ and suicide is a leading cause of death among young people in India⁽³⁾.

Adolescence are individuals in the age group from "10 years to 19 years". Also, it can be categorized in three as early, middle and late. In India, adolescents (10 -19 years) constitute 21.4 percent of the population comprising one fifth of the total population⁽⁴⁾. They are the individual who are confused, immature and

unaware about how to cope up with unpleasant situations and therefore most vulnerable to addiction from peer group, depression, hormonal related problems.

According to census carried out in 2011, Maharashtra was the second most populated state in India⁽⁵⁾ and Pune is the second most populated city in Maharashtra after Mumbai. According to National Crime Record Bureau, Maharashtra had highest number of suicidal cases⁽⁶⁾. Pune has been an education hub of Maharashtra for more than a decade. As suicidal death among adolescents is on rise in Pune, this medico-legal study is carried out to find out the possible causes behind committing suicide among adolescent and also psycho-social issues associated with it.

Material and Methods

This is a retrospective autopsy-based study, conducted at the Department of Forensic Medicine, B. J. Government Medical College and Sassoon General Hospital, Pune from 1 June 2018 to 31 May 2019. All the deceased between 10 to 19 years who had committed suicide and were brought for medico-legal autopsy at our center were included for the present study. The information in relation to suicide was obtained from the inquest, detail autopsy report, telephonic talk to the Investigating police officer and relatives of the deceased. The data obtained was tabulated, compiled and assessed systematically.

Observations

During the study period of one year, total 6580 medico-legal autopsies were conducted at our center, out of which 84 cases (1.27%) of suicide were observed among adolescent age group (11-19 yrs).

Table 1 - Age wise and sex wise distribution of cases of suicide among adolescent

Sex	Early (10-14 yrs)	Middle (15-17 yrs)	Late (18-19 yrs)	Total
Male	04 (4.76%)	05 (5.95%)	15 (17.85%)	24 (28.57%)
Female	09 (10.71%)	22 (26.19%)	28 (33.33%)	59 (70.23%)
Transgender	00 (00%)	00 (00%)	01 (1.19%)	1 (1.19%)
Total	13 (15.47%)	27 (32.14%)	44 (52.38%)	84 (100%)

Table number 1 shows maximum number of cases (52.38 %) was observed in late adolescent age group (18 - 19 years) and least number of cases (15.47 %) was observed in early adolescent age group. Female predominance (70.23 %) was observed with F:M ratio was 2.45:1. One transgender case (1.19%) was also observed who committed suicide in late adolescent stage.

Table 2 - Methods used for committing suicide among adolescent

Sex	Hanging	Poison	Jump	Total
Male	20 (23.809)	0	4 (4.76)	24 (28.57%)
Female	46 (54.76)	13 (15.476)	0	59 (70.23 %)
Transgender	1 (1.19%)	00 (00%)	00 (00%)	1 (1.19%)
Total	68 (79.76%)	13 (15.47%)	04 (04.47%)	84 (100%)

Table 2 shows hanging (79.76 %) was the most common method used for committing suicide while poisoning (15.47 %) and jump from height (04.47 %) were other methods used for committing suicide.

Table 3 - Place used for committing suicide among adolescent

Sex	Residence	Non-Residential Area	In Yard Near home	Total
Male	16 (19.04%)	6 (7.14%)	2 (2.38%)	24 (28.57%)
Female	45 (53.57%)	10 (11.90%)	4 (4.76%)	59 (70.23 %)
Transgender	1 (1.19%)	00 (00%)	00 (00%)	1 (1.19%)
Total	62 (73.80%)	16 (19.04%)	6 (7.14%)	84 (100%)

Table number 3 shows maximum adolescent (73.80%) preferred their own residence for committing suicide rather than non-residential area (19.04%).

Table 4 - Time of incidence of committing suicide among adolescent

Time of Injury	6 am to 12 pm	12 pm to 6 pm	6 pm to 12 am	12 am to 6 am	Total
Male	1 (1.19%)	10 (11.90%)	8 (9.52%)	5 (5.95%)	24 (28.57%)
Female	2 (2.38%)	39 (46.42%)	14 (16.66%)	4 (4.761%)	59 (70.23%)
Transgender	00 (00%)	1 (1.19%)	00 (00%)	00 (00%)	1 (1.19%)
Total	3 (3.57%)	50 (59.52%)	22 (26.19%)	9 (10.71%)	84 (100%)

Table number 4 shows maximum number of cases (59.52 %) who committed suicide was observed between 12:00 pm to 06:00 pm and least number of cases was recorded in time period between 06:00 am to 12:00 pm (03.57 %).

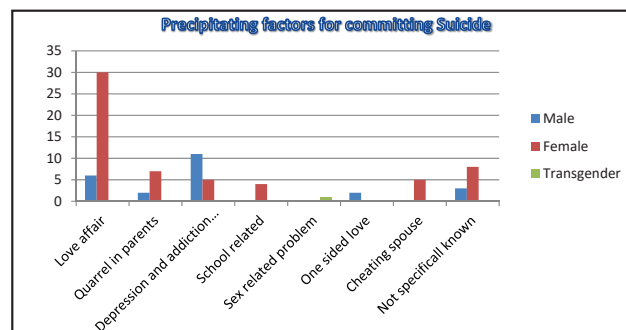


Figure 1- Precipitating factors for committing suicide among adolescent

Figure 1 shows Love affair was observed as most common precipitating factor for committing suicide (42.85 %) and other precipitating factors were quarrel between parents (10.71 %), depression and addiction (19.047 %), school related problems (04.76 %), sex related problems (01.19 %), one sided love (05.95 %). However, in 13.09% cases precipitating factors for committing suicide were not revealed by the relatives of the deceased.

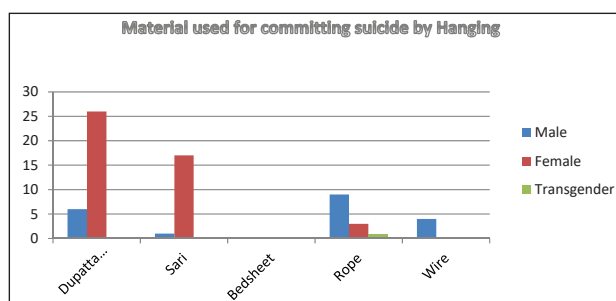


Figure 2 - Material used for committing suicide by Hanging among adolescent

Figure 2 shows Duppatta (53.57%) was the most common material used committing suicide by hanging, followed by sari (30.95%), Rope (15.47%) and least preferred material used for hanging was wire (04.76 %).

Discussion

The trend of suicide among adolescent differs from place to place and it depend upon socio-cultural practices and religious beliefs. Age-wise distribution showed maximum number of cases was observed in late adolescents (52.38 %), while study carried out by Steck N. et al ⁽⁷⁾ on suicides in adolescents from 10-18 years of age group observed maximum number of suicides (87.33 %) was in 15-18 years of age. Sheftall AH et al ⁽⁸⁾ in their study of suicides in children and early adolescents showed maximum number of cases (87.44 %) was observed in 12-14 years of age. The epidemiological study of suicide among adolescents in Austria by Laido Z. et al ⁽⁹⁾ showed that maximum number of suicide (92.3 %) was observed in 15-19 years of age. The autopsy-based study carried out by Bhosle et al ⁽¹⁰⁾ on deaths due to hanging among adolescent observed the majority (80.39%) of cases were among the older adolescent (15-19 years) age group. Findings of the present study are in consistent with other study as late adolescent phase is critical phase in life of individual were hormonal changes takes place in the body and in this phase if some

external forces and some adverse situations happens and there is no proper support system then these adolescents usually commit suicide.

In the present study, female predominance (70.23%) was observed in suicidal deaths among adolescent. Similar finding was reported by Bhosle SH et al ⁽¹⁰⁾ with female predominance (53%) among adolescent suicidal deaths due to hanging, while the study carried out by Laido Z. et al ⁽⁹⁾ showed male predominance (78%). The study Steck N. et al ⁽⁷⁾ also showed male predominance (71.45%). Shaffi M. et al ⁽¹¹⁾ in their psychological autopsy study, in the age group of 12 to19 years, observed that boy's prevalence was 90% while only 10% of those girls. Findings of the present study doesn't corroborate with other studies as it might be due to difference in study population and place of research. Also, in India there is a social stigma which is attached with suicides and attempted suicides and therefore even though individuals might have committed suicide, but it's been projected as accidental deaths, and therefore in present study, chances of missing of few suicidal cases from police record might be possible.

As far as different modes used for committing suicide, the present study observed hanging (79.76 %) was the most common method used to commit suicide followed by poisoning (15.48 %) and then Jump from height (4.76 %). Similar findings were observed by Sheftaal AH. et al ⁽⁸⁾ (64.10 %), Steck N. et al ⁽⁷⁾ (26.9 %), NCRB ⁽⁶⁾ (45.60 %) and Radhakrishnan R. and Andrade C. ⁽¹²⁾ (31.50 %). Hanging is usually preferred over other methods for committing suicide as ligature material is easily available at home and chances of death after hanging is also high as compared to other methods.

The place preferred for committing suicide by adolescent was studied and it was observed that maximum adolescent (73.80 %) preferred their own residence for committing suicide rather than non-residential area (19.04%). The study carried out by González-Castro TB et al ⁽¹³⁾ observed that most of the suicides were performed at the child/adolescent's home (78.6%). The study by Bhosle SH. et al ⁽¹⁰⁾ observed that most of the suicidal deaths due to hanging (83.67%) among adolescents were observed at the victims' home. Usually as the person prefers secluded and safe place to commit suicide without any outside interference and their own home is preferred for committing suicide.

The present study observed soft material like dupatta (53.57 %) was the most preferred material used for committing suicide by hanging and least common material used was wire (4.76 %). Similar findings were observed by Ahmed M and Hossain MZ⁽¹⁴⁾ which showed dupatta (35.17 %) was commonly used material for Hanging and least commonly used material was wire (0.06 %). The findings by Bhosle SH. et al⁽¹⁰⁾ differ from our study which showed rope (53.06 %) was more common material used for hanging than the soft material like dupatta (20.40 %). The ligature material easily available is usually preferred for committing suicide and soft material is easily available at home.

The present study tried to evaluate different precipitating factors responsible for committing suicide among adolescent. The investigating police officers, parents and friends of deceased were contacted telephonically and inquired reason behind suicide. The study observed Love affair was the most common precipitating factor for committing suicide (42.85 %) and other precipitating factors were quarrel between parents (10.71 %), depression and addiction (19.047 %), school related problems (04.76 %), sex related problems (01.19 %), one sided love (05.95 %). While few participants refused to disclose specific reason. The study by Sahoo M. et al⁽¹⁵⁾ also discussed precipitating factors for attempted suicide among adolescent as increased family conflicts, peer-interpersonal problems, perceived humiliations and personality traits. The study by Bhosle S.H. et al⁽¹⁰⁾ about deaths due to hanging among adolescent observed that the predisposing and precipitating factors were domestic strife, examination-related stress, and physical and psychological illness.

Conclusions

Adolescents are different from adults at many aspects, they lack experience to handle things and mostly prone to peer pressure. There should be free conversation between adolescent and parents. The early signs of loneliness, aggressive behavior and change in behavior should be carefully observed and if required counselling session can be done to avoid suicide among adolescent.

Ethical Clearance - Not Applicable.

Source of Funding - Self.

Conflict of Interest - Nil.

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Analysis of Medicolegal Awareness Among Fresh Indian Medical Graduates

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How to cite this article: Umesh Kumar Choudhary, Biyabani Naushad Husain, Ajit Malani, Vinod Rathod, Neha Choudhary et al Analysis of Medicolegal Awareness Among Fresh Indian Medical Graduates. Volume 22 | Number 3 | July-September 2022

Abstract

Introduction: Recent escalating trend in litigation against doctors is an issue of top concern, one important reason for it is poor handling of medico-legal cases.

Aims & Objective: To evaluate the status of knowledge about common medico-legal terminologies/cases among fresh Indian Medical Graduates(IMG) and problems if any in teaching medicolegal aspects in the medical curriculum.

Material & Methods: Observational analytical study involving 150 fresh IMG's working in medical colleges as interns or faculty with experience less than 1 year, using questionnaire of 30 pre-validated questions based on Likert's scale.

Results: In our study we observed that 99% IMG's are not able to handle medicolegal cases independently. Most of IMG's have poor knowledge of certification of death(60%), injury(87%) etc. and important medicolegal concepts like vicarious liability(62%) and ethical aspects of artificial insemination(75%). 58 to 91% IMG's have fair knowledge of different acts. 53% and 44% IMG's have fair knowledge of rights of patients and record keeping respectively. More than 90% participants didn't have any experience with investigating authorities or court. 64% IMG's would prefer to consult forensic medicine expert in medicolegal complications. No participant had attended any workshop or training session on medicolegal cases. More than 90% IMG's believe that UG teaching for medicolegal concepts and exposure to medicolegal cases is not sufficient.

Conclusion: Medicolegal awareness among IMG's is poor leading to inability of IMG to handle medicolegal cases independently.

Keywords: Medicolegal, Awareness, IMG, UG curriculum.

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Introduction

The Medical profession is considered as the most pious profession all over the world. The relationship between doctor and patient is based on trust and confidence but these trust, sacredness and confidence, has become the talk of olden days and now it sounds hollow. Lucky doctors of the past were treated like God and people revered and respected them.¹

The recent increasing trend in litigation against doctors is an issue of paramount concern. There is growing anxiety both within the medical profession and in the community regarding increasing trends of complaints and lawsuits against doctors.²

Now the doctor-patient relationship has deteriorated considerably and medical negligence is on the increase. With commercialization spreading to all aspects of our lives, the medical profession and services rendered by hospitals and private clinics are going through dramatic changes.¹

With the increasing use of technology, paradigm shifts in patient's attitude towards the doctor have resulted in making the law an inseparable entity of health care today. The reasons for these are media, professional accountability and decision making. The negativity spread through the media has done further damage to the once considered white collar profession.² Some incidences cause suffering to the patients, forcing the legislature and the public to think twice about the credibility and authenticity of medical treatment given to the patients.¹

Today's medical practitioners need knowledge of the law governing the practice of medicine. The practice of law and the practice of medicine increasingly overlap. Changes to legislation place an increased burden on health care providers to update their medicolegal knowledge continually. The trend in recent years toward codifying individual rights and freedoms has filtered down to the relationship between physicians and patients. For example, one group (e.g. patients) is given rights, another group (eg, physicians) is charged with obligations and responsibilities to respect and uphold those rights.³

The knowledge of medical negligence and medical ethics are essential for maintaining the patient doctor relationship and prevent the commercialization of the profession. Ignorance of the law cannot be used as a ground for escaping punishment. Therefore doctors should be familiar with the regulations and

laws dealing with medical practice. Training period is the crucial time for developing the ethical views and awareness in young doctors.⁴

As per the Medical Council of India amendment act no.24 of 1964, the Council has specified a warning notice that violation of this ethical code shall constitute "infamous conduct in a professional sense; i.e. it will be Professional Misconduct. Control of medical profession by the legislative actions of the government through various legal provisions like MTP act, PNDT, CPA were enacted to curb the growing malpractice in medical profession. Numerous verdicts of the courts on cases between doctors and patients have frequently been in favor of the patients which have proved the guilt of the faltering physicians.⁵

Ethics teaching has been shown to have a significant influence on the professionalism and moral qualities of medical professionals.⁶ The instructional programs in medical education field are aimed at developing a competent medical graduate. However, the current student community gives importance only to cognitive domain, which is essential to get through postgraduate entrance tests. A medical graduate should have sufficient knowledge about medicolegal cases and his role as a responsible learned citizen in assisting the administration of law and justice in the country.⁷

Forensic Medicine and Toxicology is a very important subject that deals primarily with evidence in criminal cases. The syllabus for undergraduate students of this important subject was reduced over the years, hence is losing its significance.⁸

Day by day there is increase in complaints against both government and private doctors by the patients, and judicial system is also passing negative remarks about doctors. Doctors are called to the court to give expert witness regarding assault cases, poisoning cases. Due to lack of proper medicolegal knowledge, most of the doctors are very badly exposed in courts. Every doctor should realize that irrespective of the post graduate specialty they choose, throughout their career they have to deal with medicolegal cases. Hence they should have sufficient knowledge about medicolegal aspects whether they work in private clinics or government hospitals. Keeping the above facts in mind, medical colleges all over India should increase the importance of Forensic Medicine and Toxicology subject by covering all its aspects.⁸

Keeping the above facts in mind, we carried our study to know medicolegal knowledge of fresh Indian Medical Graduates (IMG's) and also to make them aware of medicolegal issues, so that they can handle medicolegal cases effectively.

Aims & Objectives

1. To evaluate the status of knowledge about common medicolegal terminologies / cases among fresh IMG and medical faculty.
2. To evaluate problems if any in teaching medicolegal aspects in medical curriculum regarding medicolegal issues.
3. To recommend possible solutions.

Material and Methods

- The present Observational analytical study was carried out at a Medical College in Udaipur with sample size 150.

Inclusion criteria

- Students who have passed final MBBS with less than one year experience or working as Interns in hospital.

Exclusion criteria

- Doctors/Faculty with MBBS degree working at the Institute with experience more than one year or with degree other than MBBS and MD/MS degree.

Methodology

- A questionnaire comprising of pre-validated 30 multiple choice questions was prepared and given to participants after taking consent for voluntary participation.
- Knowledge of participants was assessed and analyzed on the basis of their answers for the questionnaire designed.

Results

The study population comprised of 40% female and 60% male participants. Out of 150 participants about 82.67% (124 participants) were of the opinion that UG curriculum teaches fair amount of knowledge about

medicolegal responsibilities. 8.67 % (13 participants) consider UG teaching good to excellent in addressing medicolegal responsibilities while 8.67 % (13 participants) considered it poor in it (Table 1).

Out of total 150 participants 87.33% (131 participants) felt that they are poor in issuing injury certificate, 60% (90 participants) are poor in issuing death certificate, 92% (138 participants) were of the opinion that they are poor in examining accused / victim of sexual assault and 64% (96 participants) considered themselves poor in examination of case of alcoholism.(Table 1)

Regarding common acts which are related to day to day practice. 64% (96 participants) had poor to fair knowledge of MTP act, 94% (141 participants) had fair to poor knowledge of PCPNDT act, 90% (135 participants) and 70.67% (106 participants) had fair to poor knowledge of Organ transplantation act and consumer protection act and its importance in day to day medical practice respectively. (Table 2)

With respect to common medicolegal terminologies/concepts, 91.33% (137 participants) had fair to good knowledge of informed consent, while 100% participants claimed poor to fair knowledge of professional indemnity insurance, 84.6% (127 participants) and 92% (138 participants) had poor to fair knowledge of medical negligence and vicarious liability respectively.(Table 3)

Among 150 participants, 48% (72 participants) had good knowledge of importance of record keeping while 44.67% (67 participants) had fair and 7.33% (11 participants) had poor knowledge of the same. Whereas, out of 150 participants 68% (102 participants) had fair knowledge of guidelines on preservation of medical and medicolegal records, 24% (36 participants) had poor and 8% (12 participants) had good knowledge of guidelines on preservation of medical and medicolegal records.(Table 2)

86% (129 participants) were of the opinion that they are bound to report every case of suicidal attempt to investigating authorities. 97.33% (146 participants) of the participants could independently decide which cases are to be sent for medicolegal autopsy. 66% (99 participants) participants were of the opinion that MLC is to be registered irrespective of the patients or relatives request. (Table 4)

Out of 150 participants 137 claimed to have poor to fair knowledge of examination and medicolegal

responsibilities in case of poisoning. 103 of 150 participants claimed poor knowledge of importance of evidence preservation while 42 had fair and 5 had good knowledge of it. (Table 3)

Majority of participants (142/150) never had any experience with investigating agencies while 3 claimed Fair and 5 claimed Poor experience. None of the participants had any experience of testimony in court.(Table 2)

96 (64%) participants would like to consult forensic medicine experts in problems related to medicolegal cases while 41(27%), 09(06%), 04(3%) would prefer to consult lawyer, administration and CMO respectively.

79% of Fresh IMG's believed that exposure to medicolegal cases in UG curriculum is not sufficient. 95% of Fresh IMG's believed that more importance should be given to medicolegal aspect in UG curriculum in comparison to present status. 97% of IMG's have not attended any CME/ Workshop/ Conference related to medicolegal issues and 99% of Fresh IMG's cannot handle medico- legal cases independently. (Table 5)

Table 1: Competency of IMG in issuing common medicolegal certificates and UG curriculum in teaching medicolegal responsibilities.

Parameter	Very poor	Poor	Fair	Good	Excellent
Competency in issuing correct injury certificate independently ?	00%	87.3%	9.3%	3.3%	00%
Competency in issuing correct death certificate independently ?	00%	60%	32.6%	7.3%	00%
Competency in examination of victim/accused of sexual assault ?	00%	92%	7.3%	0.6%	00%
Competency in examination and certification of alcoholism ?	00%	64%	24.6%	11.3%	00%
UG curriculum in teaching medicolegal responsibilities	00%	8.67%	82.6%	8.67%	00%

Table 2: Knowledge of fresh IMG'S regarding important acts, guidelines related to medical practice and experience with legal system.

Parameter	Very poor	Poor	Fair	Good	Excellent
MTP act	00%	5.3%	58.6%	37.3%	00%
PCPNDT act	00%	2.6%	91.3%	6%	00%
The Human Organ Transplantation act	00%	6%	84%	10%	00%
Consumer protection act and its importance	00%	10.6%	60%	29.3%	00%
Importance of medical record keeping	00%	7.3%	44.66%	48%	00%
Guidelines for preservation of medical and medicolegal records	00%	24%	68%	08%	00%
Experience with investigating agencies	00%	3.33%	02%	No experience: 94.67%	
Experience in court for testimony	Never experienced				

Table 3: Knowledge of Indian Medical Graduates regarding common medicolegal terminologies / concepts and handling cases of poisoning.

Terminology/ Concept	Very poor	Poor	Fair	Good	Excellent
Informed consent	00%	8.6%	68%	23.3%	00%
Professional Indemnity Insurance	00%	72%	28%	00%	00%
Medical Negligence	00%	7.3%	77.3%	15.3%	00%
Vicarious Liability	00%	62%	30%	8%	00%
Examination and medicolegal responsibilities in case of poisoning	00%	37.33%	54%	8.67%	00%
Importance of evidence preservation	00%	68%	28%	3.33%	00%

Table 4: Competency of fresh IMG's in handling MLC cases.

Parameter	Yes	No

Whether bound to report every case if suicidal attempt to investigating authorities?	14%	86%
Can decide independently which cases are to be sent for medicolegal autopsy or not.	2.6%	97.3%
Need to register MLC irrespective of patients or relatives request or not.	34%	66%

Table 5: Exposure to medicolegal cases and handling.

Parameter	Yes	No
Is Exposure to medico legal cases sufficient in your UG curriculum.	21 %	79 %
Should medico legal education be given more importance than its present status in medical teaching curriculum	95 %	5 %
Attended any CME/ Workshop/ Conference on Medico legal case/ issue	03 %	97 %
Handing medico legal case independently	01 %	99 %

Discussion

With increased use of internet, electronic and print media there is an increase in awareness among public on the subject of ethical conduct of medical practitioners. Hence there are more litigations against doctors, which is an issue of immediate concern to the medical fraternity. To keep away from this, doctors need to make acquainted themselves with laws and regulations governing their practice and fulfilment of ethical, moral and legal obligations in their duties.

In our study, total of 157 responses were received out of which 7 were incomplete and hence rejected.

We observed that out of total 150 participants, 60% were male and 40% were females. This is similar to observation of Alex M Varghese (57.2% male and 42.8% female), Uma Pandey (70% male participants), Anil Haripriya (55.42 % males) and Contrary to Mamdouh kamal zaki (40.6 percent male).

We observed that 82.67% (124) participants believed that present UG curriculum teaches fair amount of knowledge about medicolegal responsibilities.

In present study 87.33% (131), 60% (90), 92% (138), 64% (96) participants considered themselves poor in issuing injury certificate, death certificate, examining

accused / victim of sexual assault and examination of case of alcoholism respectively. Similar observations were reported by G Venkat Rao (4.16% know how to write injury certificate, 20.83 had fair knowledge about death certificate), Mamdouh kamal zaki (4.1% and 20.83% had knowledge of injury certificate and death certificate respectively).

We observed that 64% (96), 94% (141), 90% (135), 70.67% (106) participants had poor to fair knowledge of MTP act, PCPNDT act, Organ transplantation act and consumer protection act(CPA) respectively. Above findings were similar to observations of Anil Haripriya (More than 70% aware about CPA), Mayuresh J Baheti (41.8 % not aware of CPA), jasuma j ra (52% and 85% had knowledge of CPA and organ transplantation act respectively). Contrary observations were reported by Mamdouh Kamal Zaki (52% and 85% had knowledge of CPA and organ transplantation act respectively), Radhika T (about 31% have knowledge of CPA), S Senthilkumar (18.8 % were aware of copra) and G Venkat Rao (20.83 % aware of CPA).

In this study, 91.33%(137) participants had fair to good knowledge of informed consent, all 100%(150) participants had fair to poor knowledge of professional indemnity insurance, 84.6%(127) and 92%(138) participants had fair to poor knowledge of medical negligence and vicarious liability respectively. Similar observations were reported by G Venkat Rao (69.16% had fair awareness about consent), Mayuresh J Baheti (80% were aware about consent), S Senthilkumar (87.4% were aware about consent), Radhika T (75% HAD knowledge about consent being experience members), Mamdouh kamal zaki (69.2% knew best type of consent while 100% basic knowledge of negligence), Jasuma J Ra (100% had basic knowledge of negligence), Alex M Varghese (54%had knowledge about consent while 46.5% had no knowledge of vicarious liability), Jasuma J Ra (55% had no idea of vicarious liability) and Mamdouh kamal zaki (55% had no idea of vicarious liability). Differing findings were reported by Uma Pandey (20% were aware about consent and 10% aware about medical negligence), Mamdouh kamal zaki (21.74% knew about importance of consent), Jasuma J Rai (90% interns had no knowledge of informed consent), Mayuresh J Baheti (13.54% knew about indemnity insurance), Mayuresh J Baheti (92% were not aware about course regarding medicolegal issues) and S Senthilkumar (76.1% had no knowledge of indemnity

insurance).

It was observed that 48%(72) participants had good knowledge while 44.67%(67) participants had fair knowledge of importance record keeping. Whereas, among 150 participants 68%(102) had fair knowledge of guidelines of preservation of medical and medicolegal records while 24%(36) participants had poor knowledge of the guidelines. It was similar to observations of Anil Haripriya (77% had knowledge of record keeping), Jasuma J Rai (94% knew about record keeping), Radhika T (59.3% had knowledge of record maintenance) while contrary findings were reported by G Venkat Rao (38.33% present had knowledge about duration of medical record preservation) and Jasuma J Rai (45% had poor knowledge of medicolegal record keeping and guidelines)

It was observed that 86%(129) participants were of the opinion that they are bound to report every case of suicidal attempt to investigating authorities, 97.33%(146) participants could independently decide which cases are to be sent for medicolegal autopsy and 66%(99) participants were of the opinion that MLC is to be registered irrespective of the patients or relatives request. Similar observations were reported by Mamdouh kamal zaki (76.6% MLC is to be registered irrespective of patients and relatives request while 75% could decide which body is to be sent for autopsy), G Venkat Rao (90 % can decide which body is to be set for autopsy and 76.66% know action to be taken in registering MLC irrespective of patients request)

It was observed that out of 150 participants 91.3%(137) claimed that they have poor to fair knowledge of examination and medicolegal responsibilities in case of poisoning, while 68.67%(103) participants had poor knowledge of importance of evidence preservation. Contrary findings were reported by G Venkat Rao (56.66% knew importance of preservation of evidence in sexual assault cases, 91.6% and 71.6% knew importance of preservation of gastric lavage and steps of management of poisoning), Mamdouh kamal zaki (56.66% had knowledge of collection of evidence in sexual assault cases, 71.66% knew important steps in management of case of poisoning).

94.6% participants never had any experience of dealing with investigating agencies, while none of the participants had any experience of testimony in court.

It was observed that 96(64%), 41(27%), 09(06%), 04(3%) participants would like to consult forensic

medicine experts, lawyer, administration and CMO respectively in problems related to medicolegal cases. Contrary findings were reported by Jasuma J Ra (40% to consult head of own department, 30% to consult lawyer, 12% preferred to consult supervisor) and Mamdouh kamal zaki (40% preferred to consult head of own department followed by lawyer 30%).

It was observed that 79% of IMG's felt exposure to medicolegal cases in UG curriculum is not sufficient and 95% of IMG's believed that more importance should be given to medicolegal aspect in UG curriculum in comparison to present status. 97% IMG's did not attend any CME/ Workshop/ Conference related to medicolegal issues. Similar findings were reported by Mayuresh J Baheti (90.46% believed more medicolegal issue should be taught in UG), S Senthilkumar (81% did not study about medicolegal issues in UG while 95.1% NEVER attended any CME), Mayuresh J Baheti (14.15% attended some CME on medicolegal issues). Opposite observations were reported by Mamdouh kamal zaki and G Venkat Rao (less than 50% consider UG teaching is not sufficient in teaching medicolegal responsibilities).

99% IMG's claimed that they cannot handle medico-legal cases independently which was lesser than observations of G Venkat Rao (only 30% could handle MLC independently).

Conclusion

- Exposure to medicolegal cases during UG teaching is NOT sufficient.
- The knowledge of routine medicolegal certification and medical jurisprudence is poor.
- Most of the Indian Medical Graduates cannot handle MLC independently.

Recommendations

- Teaching hours of Forensic Medicine in UG curriculum should be increased further with involvement of new methods of teaching & learning.
- Compulsory Casualty and mortuary posting under Forensic Medicine Department during IInd / IIIrd professional phase and internship.

No conflict of interest

No external funding agency

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Women Obesity Pregnant and Assumed Proportions Epidemics Significant Chronic Diseases

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How to cite this article: Zubaidah Ibrahim Younus Al Gaoale, Khansaa Ghanim Sheekhoo Al- Azzawi, Mirvet Basim Dhannoon Al-Sabaawi et al Women Obesity Pregnant and Assumed Proportions Epidemics Significant Chronic Diseases. Volume 22 | Number 3 | July-September 2022

Abstract

Obesity is one of the most socially significant chronic diseases, that has taken the magnitude of the epidemic, with increasing attention to obesity in pregnant women. Despite continuous improvement of surveillance system for antenatal and obstetric care, the number of pregnant women with obesity is increasing, in this connection, this problem is of special importance.

The present review covers the basic mechanisms involved in development of obesity and hormonal disorders in pregnancy, the risks and complications associated with obesity in pregnancy. As well as measures for the prevention of excess weight before and during pregnancy.

Keywords: obesity, pregnancy, insulinresistance, gestational diabetes.

Introduction

Obesity is one of the most socially significant chronic diseases, which has assumed proportions epidemics (according to WHO).

Constantly growing - increasing rates of obesity worldwide, as well as obesity-related increased disease burden and mortality, made it one of the most active health problems of modern health care, increasing attention to obesity pregnant. Despite constant improvements, system of antenatal monitoring and obstetrics opportunities, the number of pregnant women with obesity in the economic developed countries reaches 15.5–26.9% and constantly increases, in connection with which the relevance of this problem acquires special significance [9].

The main synthesis of sex hormones occurs in the

ovaries and adipocytes are the site of extragonadal synthesis of estrogens from androgens by aromatic Androstenedione and testosterone conversion and conversion into estrone, and then it turns into a more active estrogen - estradiol. In obesity, peripheral aromatization of androgens into estrogens increases, resulting in impaired androgen metabolism and estrogens [2,7].

Estrogen metabolism changes with obesity by reducing the formation of inactive metabolites estradiol, especially 2-hydroxyestrogens, and increased changes in the amount of estrone sulfate, resulting in a change ratio of active to inactive estrogens in favor of active ones and relative hyperestrogenemia, which can lead to the development of hyperplastic processes of the endometrium and dysfunction ovaries.

The estrogen ratio during pregnancy changed mainly due to increased production, which has low activity, but you is divided in very large quantities, in connection with which it the effect during pregnancy is much stronger, than other estrogens. Estradiol content and estrone during pregnancy increases a hundred times, and - a thousand times [6].

During pregnancy, it increases as production, and androgen inactivation due to increase the rate of their metabolic clearance, which leads to to maintain a normal ratio of levels of cumulating androgens, but in 20-50% of pregnant women with obesity, there may be a significant increase lowering the level of androgens (testosterone, dehydroepiandro- sterone, dehydroepiandrosterone sulfate), and developing

There is hyperandrogenism, which can lead to to miscarriage [3].

Also involved in the regulation of adipose tissue deposition progesterone, the content of which during pregnancy increases. Progesterone is known to compete with glucose cocorticoids for their receptors in adipocytes, thus preventing the lipolytic effect effect of glucocorticoids on adipose tissue.

As a result of increased activity of the hypothalamus - pituitary gland - adrenal glands during pregnancy increased production of tropic hormones (somato- ropnoe, prolactin, adrenocorticotropic hormone (ACTG)). In connection with the increased formation of ACTH, increases the hormonal activity of the adrenal glands, synthesis of glucocorticoids (cortisol) and mine- ralocorticoid (aldosterone), which is adaptation of the female body to the necessary activation of vital processes to meet needs of the developing fetus. Aldosterone in blood circulation increases, starting from the eighth week of pregnancy, and increases up to ten times by childbirth [6]. During pregnancy, the placenta produces hypo- physical-like hormones (chorionic gonadotropin- and corticotropin, placental lactogenic, adreno- corticotropic hormone), hypothalamic hormones (gonadotropic, corticotropic and thyrotrophic rile- zing hormones, somatostatin), adipocyte-specific hormones such as leptin, resisting [11].

Placenta sec- retards a large number of cytokines (interleukin-1, interleukin-6, tumor necrosis factor), growth factors (insulin-like growth factor-1, epidermal factor- growth factor, platelet and fibroblast growth factors, inhibin and activin) and pregnancy-specific proteins necessary for the growth and development

of the fetus, immunity relationship between mother and fetus, providing preservation of pregnancy [6, 10].

It has now been proven that leptin in pregnant women synthesized not only by adipocytes, but also by placenta trophoblasts in an amount not less than that of the rheumatic tissue [16]. Placental leptin does not differ in structure and biological properties of leptin fat tissue and is the expression product of the same gene (obgene).

The content of leptin in blood serum is directly correlated correlates with body weight, the level of chorionic gonadotropin human pin and gestational age [16, 19]. Level leptin increases from 6-8 weeks, reaching a maximum in the II-III trimester of pregnancy, and significantly reduced occurs after childbirth [16]. An inverse correlation was also found rational dependence between the content of leptin in the blood circulation of a pregnant woman and the condition of children at birth. In the blood taken from the umbilical cord of the new born, the level of leptin produced by the placenta that, as well as adipose tissue of the fetus, is directly proportional to flax body weight and mass of adipose tissue of the newborn; it is reduced by maternal smoking, fetal prematurity, low anthropometric indicators in children, giving birth on time, and increased in too large newborns data [16]. It is assumed that the main role of the placenta tare leptin is involved in growth regulation and fetal development, stimulation of hematopoiesis and lymphopoiesis in a newborn. Leptin, found in breast milk like of the mother, can also enter the gastrointestinal tract, and then into the blood of the newborn, thereby playing an additional role in the regulation of fetal growth [16].

There is evidence of a role for ghrelin during pregnancy. Ghrelin is a polypeptide hormone secreted by predominantly by cells of the gastric mucosa, causing which creates a feeling of hunger and is a powerful stimulant growth hormone secretion. It is known that receptors for Greek lines are also located in the placenta [13]. Ghrelin level increases with increasing gestational age, reaching maximum by the middle of the second trimester of pregnancy [13].

The main role of ghrelin during pregnancy is maternal appetite regulation and increased intake energy from food to provide nutrition to the fetus. Ghrelin also involved in the regulation of contractile activity myometrium [13].

Despite multiple hormonal and enzymatic dative changes in pregnant women, stimulating

Optimal weight gain during pregnancy recommended by the American Institute of Medicine Academy of Sciences, 1990

(Table 1)

BMI before pregnancy	Weight gain for the entire pregnancy (kg)	Weight gain per week (kg)
Low body weight (BMI < 20.0)	12,5 - 18,0	0,5
normal body weight (BMI 20.0-25.0)	11,5 - 16,0	0,4
Overweight (BMI 25.0-30.0)	7,0 - 11,5	0,3
Obesity (BMI > 30.0)	< 7,0	0,3

education of adipose tissue, a major role in the development of obesity plays a positive energy balance when pre- has energy intake with food in the body over its expenses. The reason for the energy imbalance is alimentary and hypodynamic factors.

In 1990, the American Academic Institute of Medicine Mii Sciences issued recommendations for the standards of small weight gain during pregnancy, based on baseline body mass index values(BMI) currently in use(Table 1) [15].

According to these recommendations, the greater the initial body weight in a woman, the less this indicator should increase during pregnancy.

In this way, in pregnant women with normal body weight, weight gain body for pregnancy should not exceed 16 kg, and in pregnant obese patients, weight gain should be no more than 7 kg [14].

The dynamics of body weight gain depends on the duration of pregnancy ness.

In the first weeks of pregnancy, weight gain usually not noted, moreover, with the development of early toxicosis may decrease. From the 16th week pregnancy begins a slight increase in weight body; from the 23rd-24th the increase is about 200 g per week, and from the 29th it should not exceed 300-400 g [14].

The presence of obesity during pregnancy is associated with the development of serious complications for the mother and fetus.

Complications associated with obesity are most thorns for women with abdominal obesity (visceral), which in most cases is combined with a complex of hormonal and metabolic disorders and is the most unfavorable in clinical and prognostic aspects [18].

Complications of the gestational process in women with rhenium are noted in 45-85% of cases [6]. In pregnant women one and a half to two times overweight compared to with women with normal body weight, the frequency increases obesity-related diseases, an increased risk pathological course of pregnancy, childbirth and postpartum childbearing period, the frequency of having children increases with congenital malformations, which leads to an increase in rental morbidity and mortality [12].

Most often in pregnant women, cardiovascular common diseases (17.1-43.5%), infectious diseases due to a decrease in immunological resistance organism (51.6-59.7%), diseases of the digestive system (3.8-7.9%), urinary system (4.8-9.9%), respiratory organs (7.1%) [6].

If there are concomitant somatic diseases during pregnancy, their current the condition deteriorates significantly.

Obesity of pregnant women is considered as a non- dependent risk factor for the occurrence of severe forms preeclampsia (hypertension of pregnant women, preeclampsia and lampsia), which are the most common complications during pregnancy.

The frequency of late gestosis, pro- which are an increase in blood pressure more than 140/90 mm Hg, edema and proteinuria, about three times higher in obese women than in women with normal body weight [3, 9].

Development late gestosis in pregnant women is associated with obesity with metabolic changes: endothelial dysfunction and systemic inflammation, especially pronounced in women with abdominal obesity before pregnancy ness, as well as hemodynamic disorders in the swarm half pregnancy. Pregnancy complicated preeclampsia, seven times increases the risk of developing cardiovascular vascular diseases in the mother in the future [6].

It is known that pregnancy in the third trimester is accompanied by is given by physiological hypercoagulability as a result of decrease in natural antithrombotic protection and increased activation of antithrombotic mechanisms leading to an increase in coagulation factors blood, TNF- α level, plasminogen and activity plasminogen activator inhibitor. In pregnant women with obesity due to insulin resistance data changes are more pronounced, and the frequency of development of cardiovascular vascular and thrombotic complications increases.

It is known that elevated levels of TNF- α and inhibitor plasminogen activator are independent factors thrombophilia and the development of thrombosis during pregnancy precariousness^[4].

Often diagnosed during pregnancy various disorders of carbohydrate metabolism, including and diabetes mellitus, previously asymptomatic.

With a normal pregnancy in the first trimester insulin sensitivity increases as a result effects of the placental complex itself or light who reduce body weight with preeclampsia. Subsequently, with increasing gestational age, insulin production increased sensitivity of peripheral tissues to insulin decreases and physiological insulin resistance.

These changes are taking place due to the action of contrainsular hormones (placental- lactogen, placental growth hormone), estrogen, progesterone and cortisol, whose action is directed leno to meet energy needs fetoplacental system due to increased lipolysis and ketogenesis to provide the fetus with energy. After childbirth peripheral sensitivity to insulin rapidly recovers to normal^[6, 17]. In the presence of obesity before pregnancy, especially dominant, which in most cases is associated occurs with the development of insulin resistance, hyperinsulin and is manifested by various disorders carbohydrate metabolism, the concentration of insulin walkie compared to normal women weight and, consequently, increases the risk of developing disorders changes in carbohydrate metabolism, including gestational diabetes^[20]. The risk of developing gestational diabetes in the general population is 2-6%, and in the presence of obesity before pregnancy the value increases to 17%^[9]. In turn, gestational chronic diabetes increases the risk of developing type 2 diabetes, which develops in more than a third of women with obesity (30%) within 15 years after childbirth^[3, 6]. According to the crit-WHO guidelines, the diagnosis of gestational diabetes is

established with an increase in the level of glycemia on an empty stomach in the plasma of venous blood > 7.0 mmol / l and two hours later, against the background of oral glucose tolerance test with 75 g without- aqueous glucose >7.8 mmol/l^[3].

Based on the assessment risk factors and careful history taking diabetes in children belt can be diagnosed only in half of the cases teas. According to the American Diabetes association, all women in the presence of factors risk of developing gestational diabetes at 24-28 weeks del pregnancy necessarily carry out oral glucose tolerance test, and in the presence of gestational history of diabetes during a previous pregnancy oral glucose tolerance test children for a period of 16-18 weeks.

Risk factors for development gestational diabetes are: pregnancy large fetus (>4500 g) or stillbirth in history, obesity pregnancy (BMI > 30 kg/m²); polyhydramnios; age over 30 years old; T2D in first-degree relatives stva (parents, siblings, children); fast weight gain during this pregnancy.

Risk of developing complications of gestational diabetes for mother and fetus depends on its compensation.

Inadequate compensation of gestational diabetes leads to the development of hyperglycemia in the fetus, as a result of which in the first trimester of pregnancy, defects can form development of the heart, spine, gastrointestinal tract and spinal cord. In the second trimester of pregnancy hyperplasia develops in response to hyperglycemia cell dysfunction of the fetal pancreas followed by fetal hyperinsulinemia, which can lead to macrosomia, a tendency to severe and prolonged hypoglycemia in the fetus and the formation malformations of the central nervous system Thus, maintaining a woman's normal blood glucose levels during pregnancy, adequate compensation for gestational diabetes are one of the the most important conditions for favorable gestation of the fetus.

Obesity increases the risk of various obstetric complications: threats of miscarriage (32.5%), preterm (10.8%) and late (6.0%) births, anomalies labor activity (30.1%), birth injury (45.7%), as well as violations of the functioning of fetoplates central complex with the development of intrauterine hypo- fetal xia (60%) and fetoplacental insufficiency (10.8%), neonatal macrosomia (18.1%)^[1, 9].

The most common obstetric complication in pregnancy obese is miscarriage^[9]. Moreover, even excess body weight leads to significant increased risk of miscarriage due to development of hyperandrogenism and hyperinsulinemia.

Frequency miscarriage and spontaneous discharge miscarriages in obese women is 25–37%^[9].

With obesity, the frequency of premature intermitted childbirth and recurrent pregnancy. generic dominant in obese women by the end of pregnancy is not completely formed, which leads to 10-15% to prolongation of pregnancy and the development of wee labor activity, the severity of which increases is proportional to the degree of obesity, as a result of which in most cases, operative delivery is used resolution (caesarean section)^[9].

In some cases, it is necessary The reason for the caesarean section may be due to discrepancy between the size of the pelvis of the mother and fetus, since obese pregnant women are more likely to have children with macro- somy. Macrosomia of the fetus is determined at a weight of more than 4000 g (90th percentile); the frequency of birth of such children is makes 20 - 44%^[9]. In turn, surgical intervention pregnancy (caesarean section) in obese pregnant women is also associated with the risk of developing thrombotic complications, poor postoperative healing scars.

Frequency of operative delivery due to with complicated childbirth in obese women two to four times compared with pregnant women, schism normal weight.

A large number of complications of pregnancy and childbirth are not negatively affects not only the condition of the mother, but also fetal condition. With obesity, the frequency of as- fixation of newborns, congenital anomalies of the fetus, intrauterine death, fetal malformations, birth injury, early neonatal death.

Despite the high risk of developing complications in belt women with overweight, obesity is not a contraindication to pregnancy. When under- preparing for pregnancy and childbirth, a woman needs a thorough examination, observation not only obstetrician- gynecologist, but also endocrinologist, nutritionist; conducting constant monitoring of body weight, blood pressure, the state of carbohydrate metabolism throughout pregnancy.

As already mentioned, one of the reasons for the development of rhenium in pregnant women is overeating, and therefore obligatory observance of dietary recommendations dation and compliance with the regime of physical activity, which can significantly reduce the risk of complications in mother and fetus.

In a metabolic sense, pregnancy is is a state in which anabolic- processes necessary for the formation of new tissues her. There are data emphasizing that exactly nursing during pregnancy is one of the most important components of the health of the unborn child.

Any extreme diet during pregnancy ness, both overeating and undereating can have negative predictable consequences. For example, lack nutrition, especially in the second and third trimesters of pregnancy changes, affects the weight of the fetus at birth. Except of this, nutritional deficiency of the fetus during the intrauterine period development contributes to the formation of metabolism, programmed for possibly poor nutrition in the future, i.e. undated to excess food intake and leading to the accumulation of excess adipose tissue in the postnatal period.

While with a properly balanced diet, adapt powerful physiological mechanisms make it possible to satisfactorily meet the needs of the most pregnant woman, and the fetus in macro- and micronutrients without additional Noah correction.

These mechanisms contribute to a more efficient efficient absorption of nutrients. Yes, mountains changes characteristic of pregnancy (increased levels of estrogen, progesterone, insulin), stimulate the activity of anabolic processes. In pe-period of pregnancy compared to normal women, the content of ho- leucystokinin after a meal, increases the absorption excretion of iron and calcium in the intestine, becomes more effective nitrogen metabolism, which contributes to saving reduction of nitrogen and protein^[5, 8].

It is estimated that the increase in energy demand during pregnancy is about 85,000 kcal; of which 41,000 kcal is stored as fat and lean weight in a woman and fetus, on metabolic processes it takes 36,000 kcal, and for such an energy process, as the movement of a heavier body and an increase in a new exchange consumes only 8,000 kcal. Thus zom, when recalculated for 280 days of the gestation period additional average daily energy requirement for a pregnant woman is on average about 300 kcal^[5, 8].

It should be noted that the trimesters of pregnancy have different energy requirements, and due to a decrease in physical activity and labor physical loads, despite the increase in physiological needs, ultimately the necessary level The energy consumption increases slightly.

An indicator of adequate satisfaction of needs in energy is the weight gain of the pregnant woman With a balanced rational diet, increase lower energy demand means more consumption of all macro- and micronutrients.

With a normal increase in body weight against the background of 9% increase comes from protein mass maternal tissues (uterus, placenta, mammary glands) and fetus [fifteen]. The greatest accumulation of protein mass occurs in the second half of pregnancy and is six-in- seven grams per day^[15]. The third trimester of pregnancy is characterized by a decrease in nitrogen excretion in the urine and increased slow protein synthesis.

At this time, the fetus accumulates about three grams of protein per day, and the average daily intake the content in the protein in a woman increases to ten grams.

As for fats, the need only increases in long-chain omega-3 fatty acids, sourced which are seafood, nuts, rapeseed, olive oil, liver, egg yolk, soy products ducts. Moreover, with a properly adjusted nutrition there is no need for additional sources protein and fat.

Increase in plasma volume during pregnancy increased renal filtration, as well as an increase in course and need for vitamins and minerals explains the decrease in their content in the blood. The main The changes concern vitamins A, D, B6 and folic acid. lots, but this process is a normal adaptation of the organism to pregnancy, and with normal nutrition also no need for additional assignment the indicated vitamins. Physical activity plays an important role for pregnant women.

Moderate physical activity (walking 30 minutes per day) reduce the risk of complications during pregnancy pregnancy, such as preeclampsia, gestational die-Beth and others ^[15].

Prevention of excess weight before pregnancy and during pregnancy itself, including control body weight and various metabolic disorders, maintaining a properly balanced diet and adequate wadded physical activity, will help prevent a range of negative

consequences associated with obesity eating during pregnancy Conflict of interest: There is no conflict of interest among the authors.

Funding: Self

Ethical Clearance: This study is ethically approved by the Institutional ethical Committee

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Urinary Tract Infections in Pregnant Women. New Opportunities Anti-Relapse Therapy

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How to cite this article: Zubaidah Ibrahim Younus Al Gaoale , Khansaa Ghanim Sheekhoo Al- Azzawi, Mirvet Basim Dhannoon Al-Sabaawi et al Urinary Tract Infections in Pregnant Women. New Opportunities Anti-Relapse Therapy. Volume 22 | Number 3 | July-September 2022

Abstract

Infectious processes of the urinary tract are a group of diseases often encountered in clinical practice. In particular this applies to pregnant women in early pregnancy who develop functional changes in the urinary tract. The most common pathological condition during pregnancy is asymptomatic bacteriuria.

For antibacterial drugs, prescribed on the late stages with no consideration of causative agents' sensitivity, or inadequate therapeutic doses ascending infection leading to the development of gestational pyelonephritis and other complications of pregnancy may develop. For best preventive treatment the use of antibiotic therapy, prophylactics like cranberry extract containing proanthocyanidin A or other demonstrably effective herbal based drugs, is recommended. As for the medical check-up for this group of patients, it goes without saying that it is obligatory.

Keywords: urinary tract infection, pregnancy, asymptomatic bacteriuria, gestational pyelonephritis, cranberry extract, proanthocyanidin.

Introduction

Urinary tract infections (UTIs) are widely common pathological condition (primarily this problem concerns pregnant women), often diagnosed by obstetricians-gynecologists.

Physiological pregnancy is characterized by different to a certain degree, functional changes in the MEP are disturbed decrease in tone and contractile activity of the muscles of small parts necks, pelvis, ureters, their expansion.

These changes occur in early pregnancy (6-8 weeks), reach a maximum at 18-20 weeks and increase the risk of developing infectious diseases. If in early pregnancy the main cause of dilatation of the pelvis and

ureters is hormonal factor, further joins and mechanical factor, which can lead to the formation of pyeloectasia, the occurrence of vesicoureteral reflux, creating conditions for the development of ascending general infectious and inflammatory process [1-3].

The most common pathological condition during pregnancy is asymptomatic bacteriuria, which occurs in 2-8% of women (the peak incidence is runs on the (9th-17th week), as a rule, is detected when scheduled examination [4]. At the same time, urinary infection of the exit pathways is evidenced by the detection in the middle portion urine more than 6-8 leukocytes in the field of view.

Pathogens

The main causative agent of infectious processes urinary system is *Escherichia coli* -60-90% (according to A. Moges et al., 2002). Besides, in the urine of patients, *Klebsiella*, enterococcus, *Staphylococcus aureus* and other microorganisms^[5, 6].

Diagnostics

For the diagnosis of asymptomatic bacteriuria in addition to a general urinalysis, it is recommended to conduct two consecutive studies of this material culture method with urine collection by a catheter.

The presence of the disease is evidenced by the detection of more than 10⁵ CFU in 1 ml of urine, while identification of microorganisms, definition of resistance of microbial flora to antibiotics and antibacterial drugs. In clinical practice, treatment often starts with a single detection of 10⁵ CFU / ml and more than 1 ml of urine^[7], especially when it is neutralities

Therapeutic possibilities

Treatment includes a course of antimicrobial, anti-inflammatory, phyto-, physiotherapy. From antibacterial preparations can be used penicillins (amoxicillin / clavulanate at a dose of 500 mg 2 times a day for 3-7 days) and cephalosporins (cefixime 400 mg once a day - 5-7 days, ceftriaxone 1000 mg 1 time per day for 3-5 days). It should be remembered that the use of nitrofurantoin preparations in pregnant women is limited due to the risk of developing anemia in mother and fetus^[8].

Fosfomycin is considered safe for use in time of pregnancy with the drug^[9] and, according to A. Estebanez et al. (2009), is as effective as ampicillin / clavulanate, but easier to administer (3000 mg) once in the treatment of asymptomatic bacteriuria and cystitis^[10]. But given that fosfomycin cannot penetrate deeply into the urothelium, its application is limited and shown only in the initial stages of process and early initiation of treatment

Antibacterial therapy for asymptomatic heavy bacteriuria leads to a significant decrease in frequency of gestational pyelonephritis^[11]. If therapy was not carried out, or antibacterial drugs were prescribed without taking into account the sensitivity of the pathogen, or used in insufficient therapeutic

doses, 30-40% of pregnant women may develop an ascending infection leading to the development of gestational pyelonephritis.

At the same time, about 53% of cases of acute pyelonephritis occur in the second trimester, 26% in the third^[12].

The course of acute pyelonephritis is characterized by an increase in temperature up to 38°C, dysuric manifestations, pain in the lumbar region, weakness.

Treatment of acute gestational pyelonephritis should be carried out in a hospital setting.

When intoxicated, caused by the inflammatory process, is shown des-intoxication, desensitizing, antispasmodic therapy. Antibacterial therapy should be prescribed taking into account the sensitivity of microorganisms

More effective is intravenous administration of antimicrobials.

For the treatment of can be assigned a combination of ampicillin + gentamicin, as well as cefazolin + ceftriaxone, which have approximately equivalent efficiency in relation to microorganisms that cause pyelonephritis^[13].

As in the treatment of asymptomatic bacteriuria, for treatment of pyelonephritis is currently preferred is the appointment of β -lactams, since the resistant *E. coli* resistance to these drugs, according to A. Artero (2013), the lowest^[14].

At the same time, E. Sabharwal (2012) made the opposite conclusion: the resistance of *E. coli* and other microorganisms to ampicillin - 90%, amoxicillin / clavulanate (Augmentin) - 78%, ceftriaxone - 35%^[15].

In this regard, in the conditions of increasing resistance of uropathic genes to most antibacterial drugs the role of third-generation cephalosporins in the treatment of non-complicated urinary tract infection.

Distinguish a characteristic feature of this group of antibiotics is the high activity against microorganisms of the family Enterobacteriaceae, β -lactamase resistance, long half-life, which allows the appointment of these drugs 1-2 times a day^[16, 17].

American scientists conducted a comparative multicenter study of the effectiveness of cephalosporin III generation cefixime and amoxicillin with

participation of 565 adult patients suffering from uncomplicated uncommon urinary tract infections.

Clinical

The effectiveness of cefixime was 90%, amoxicillina - 83%, eradication of uropathogens was observed in 92% patients treated with cefixime, and in 84% of patients taking amoxicillin [18].

Nevertheless, in the research vaniyah A. Alemu et al. (2012) multiple drug vein resistance of microorganisms was revealed in 95% of urine samples collected from pregnant women with infectious MVPs [19].

An increase in the resistance of microorganisms is noted found in the results of many studies [20], more and more antibiotics become ineffective, so search for new approaches to the treatment of infectious processes.

During an exacerbation of the process in the intervals between antibiotic therapy themselves, as well as for prophylaxis of exacerbation of chronic inflammatory processes urinary system should be recommended for change of herbal diuretics, antiseptics and anti-inflammatory drugs.

Active components of medicinal plants, used to treat diseases of the urinary tract and kidneys (goldcentaury, lovage, rosemary, madder, stalk bicarp, reed saxifrage, herbs bearberry, sage, wild rose, St. John's wort, horsetail field-vogo, etc.), contribute to the removal of harmful substances from the body.

substances, have antibacterial, anti-inflammatory, antiallergic, diuretic action.

Since ancient times, for the treatment of diseases of the kidneys, urinary tract zyrya, cranberries were also used [21].

The berries of this plant contain organic acids (including salicylate), fructose, vitamins C, A, K, E and group B, flavonoids, an-tocyanidins, catechins and triterpinoids. Anthocyanins and proanthocyanidins, which are part of the plant, are natural antibiotics [22].

Their mechanism of action is to inhibit bacterial adhesion, including *E. coli*, on urothelial cells, which facilitates the removal of microorganisms from the urinary tract. anti-adhesive effect of proanthocyanidins is dose-dependent and significant, which has been confirmed by numerous experiments and clinical studies [23, 24].

Except in addition, the substances that are contained in cranberry juice, changing composition of urine, do not allow pathogens to develop in it bacteria.

For an antibacterial effect recommended 2-3-fold intake of cranberry natural juice daily [25], but this treatment may have no adverse events, the most frequent of which are belching, nausea, heartburn, rapid stools, headaches, elevated blood glucose and skin reactions, so the use of cranberry extract in capsules instead of using the whole fruit last time is considered more promising [26, 27].

Zhuravit is a fruit extract large-fruited cranberries (*Vaccinium macrocarpon*), containing 220 mg of the active substance, which corresponds to 5500 mg of fresh cranberries. In addition to antibacterial, cranberry extract (Zhuravit) has a pronounced significant antioxidant effect, which was confirmed in the studies of D. Wojnicz et al. (2012), and recommended to use the drug for the prevention and treatment of urinary tract infections, including chronic and recurrent processes [28].

In a previous comparative study on study of the effectiveness of cranberry extract and trimethoprim-priming in women with recurrent urinary tract infections

M. McMurdo (2009) shows the same efficiency but with fewer side effects in women who took cranberry extract for treatment [29], which once again confirms the feasibility and safety of the use of herbal preparations.

Recommended doses of Zhuravit - 1 capsule 3 times a day for 3 days, then 1 capsule 1 time per day, long-term the duration of treatment is 2-4 weeks. This mode of reception is convenient and not burdensome for patients and promotes adherence to therapy. Cranberry extract (Zhuravit) can be used for the following diseases of the urinary tract: cystitis, asymptomatic heavy bacteriuria, pyelonephritis, as an additional means of treatment in complex therapy, and for pro-lactation of the development of an ascending infection or other complications.

Conclusion

Given the high incidence of UTIs during pregnancy, it is extremely important to prevent this pathology. Some clinicians consider it justified the appointment of preventive courses of antibiotic therapy (1-3 days), other contested.

Consider the feasibility of such an approach, taking into account the correlation risk and benefit of this therapy for the mother and fetus.

Moreover, frequent, short-term prescription of antibacterialtherapeutic drugs contributes to the development of resistantmicroorganisms, the occurrence of allergies,immunity, development of dysbacteriosis, etc.

Exactly. Therefore, in order to prevent exacerbation of chronicpyelonephritis, cystitis, widespread use is recommendedherbal preparations.

Practical Recommendations

Thus, an essential place in the complex of professionalallactic measures aimed at preventingprevention of recurrence of urinary tract infections, takes the use of temporary phytopreparations, including those based oncranberry ducts. It is also mandatory to comply personal hygiene, regimen, diet with the exception of acute, Lena food, physiotherapy exercises.

Each woman-during the entire pregnancy should be understrict supervision of an obstetrician-gynecologist, especiallyespecially at critical times (22–28 weeks),

when most oftenmanifested pyelonephritis of pregnant women. Patients giving kidney disease, require dispensaryobservation at the therapist of the antenatal clinic, systematicmedical examination, which contributes to the early detection reduction of asymptomatic bacteriuria, prevention of complicationsand timely initiation of treatment. Women who haveof which infectious diseases were detected during pregnancyand inflammatory diseases of the urinary tract, proteinuria, hematoma, pyuria, increased blood pressure, edema, andwho also had late toxicosis during the previousduring pregnancies, a thorough examination and observation during all subsequent pregnancies withmandatory therapeutic and prophylacticsky events.

Wider dissemination and implementation in routinecurrent clinical practice of complementary and alternativetherapy is an effective method of reducing the diseaseincidence of inflammatory diseases of the urinary tract during pregnancy.

Conflict of interest: There is no conflict of interest among the authors.

Funding: Self

Ethical Clearance: This study is ethically approved by the Institutional ethical Committee

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Influence of Anxiety and Claustrophobia on Blood Pressure and Heart Rate during MRI Scan

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How to cite this article: Haydar. A. Al-Shimmery, Alyaa. Raheem et al Influence of Anxiety and Claustrophobia on Blood Pressure and Heart Rate during MRI Scan. Volume 22 | Number 3 | July-September 2022

Abstract

Aim: To assess the effect of anxiety and claustrophobia on human blood pressure and heart rate during MRI scan.

Methods: Samples of 48 patients who need MRI scan service were chose. A questionnaire and scales were used to evaluate the patients' anxiety group and claustrophobia. Blood pressure and heart rate were determined in before and after the scan in the same circumstances and methods.

Results: The majority of the patients were female. The relation between anxiety scale and gender revealed that majority of the female have the high anxiety scales (68.57%). Alternatively, the minority of male have high anxiety level (40%). The relation between anxiety and claustrophobia with the systolic pressure before and after MRI scan, approved a statically significant difference with t -test=3.007 and, P value <0.05. No significant association was found of diastolic pressure and heart rate at the same time and circumstances with anxiety levels and claustrophobia.

Conclusion: This study represents significant evidence for an association of high blood pressure with high anxious and claustrophobic patients, measured before and after the MRI scan. While diastolic blood pressure and heart rate did not change during MRI exam.

Keywords: claustrophobia, blood pressure, heart rate, diastolic

Introduction

Magnetic resonance imaging (MRI) is vital medical equipment that has been steadily used as it gives image with high quality by using non ionizing radiation. For this procedure, the patients need to be scanned by a long narrow tube for approximately several minutes without movement, because technical issues which need to provide image free artifacts^[1,2].

This period of MRI procedure which includes fear, noises, stress, nervousness, stability and unfamiliar environment could make challenge to manage the scan typically with anxious or claustrophobic patients. These are common problems which occurs with the patients during the MRI scan^[3]. Anxiety is a indistinct and still vague^[4]. It has been reported that 25% to 37% of the patients undergoing MRI scan experienced substantial anxiety^[5,6]. What is more,

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the fear of enclosed spaces is called claustrophobia. Which is a common specific phobia with a prevalence of 1.0% to 15% in the general patients [7]. The American Cardiology Association emphasize that it should be important for the physician, dentist and medical staff to deal with complications that may take place in patients who have hypertension [8]. In addition to the light-headedness, nausea, fainting, fears of actual harm, the blood pressure and heart rate increasing may present with anxious and claustrophobic patient. [9]. This leads to necessity to avoid possible adverse reaction for cardiovascular disease like hypertension which could be occur with such psychological status. Recently the Global Health Risks shows that arterial hypertension remains the primary cause of mortality and morbidity in the world [10,11].

This study aims to evaluate the influence of anxiety and claustrophobia on the blood pressure and heart rate before and after the MRI scan. For this purpose, a questionnaire based on a rating scale was designed to capture the emotions feeling before the MRI scans. Blood pressure and heart rate recorded for the patients ten minutes before and after the imaging procedure in the same conditions.

Methods:

This experiment was to assess the potential for claustrophobia, anxiety and clinical relevance with MRI. All patients who agreed in participating received information about the study procedure, with free to withdraw from trail at any time before or after the MRI scan.

Eighty four patients with an age ranged between 25 to 50 years were selected in this experiment in Baghdad hospital during the period from May to October in 2015. The patients with cardiac disease were excluded to avoid solely based on arterial hypertension changes which found with their history previously [11]. For this reason, it is noteworthy that subjects who had any of the hypertension were included for the evaluation of the HR and PB.

All patients were interviewed and evaluated face to face in the next room of the MRI scan. Then they asked to answer a general health questions by the same examiner to exclude any blood pressure disorders, previous history to the hypertension or any cardiac diseases following the instructions and any drugs which were taken by the patients through 24

hours before the scan that would affect the sensitivity of results were excluded [12].

The blood pressure and heart rate measured by a digital cardiologic stethoscope in two separate times. First measurement, when the patient in the waiting room, trying to characterize the BP and HR two minutes before the MRI scans. The second measurement is taken two minutes after the scan in the same place and techniques of the first measurement. To evaluate the patients' phobia and anxiety level, before the MRI examination, patients were informed with a description of how to rate the intensity of anxiety and claustrophobia if present by using four points numerical scale; the following values were established: A=0, B=1, C=2, D=3, E=4.

The scale was used and consists of four questions with five possible answers, which characterize the patient anxiety level in response to different situations that involve a visit to the MRI exam room, and it is applied before the scan.

The sum of the values assigned to each answer, the possible interval score may vary between 4-20 points. The level of anxiety classified in naught, mild, moderate and exacerbated groups. The collected data were firstly stored in an Excel® worksheet and, then we held a descriptive statistical analysis using the SPSS®, accompanied by a form containing issues about patient identification, harmful habits, diseases, frequency to MRI visit and cardiovascular parameters. For the claustrophobic group which was detected by using a claustrophobia questionnaire according to (CLQ) [13].

Results

Figure (1) shows 48 volunteers participated in this research, (58.3%) belonged to the female with a mean age of 38 years and incomplete high education, (41.7%) belonged to male with a mean age 39. According to the aspects related to health, most of them did not have the habit of smoking, but presented a family history of systemic diseases, such as diabetes Mellitus, hypertension, cancer, heart disease, pulmonary emphysema. During the period of the patient's follow-up no systemic change that could interfere with the results of the study was detected. The relation between anxiety scale and gender revealed that majority of the female have the high anxiety scales with Claustrophobia. On the other

hand, the majority of male have mild or no anxiety level (25%), female had mild anxiety only (10%). The data obtained from the relation between anxiety scales and the age group revealed there no significant relation could be detected.

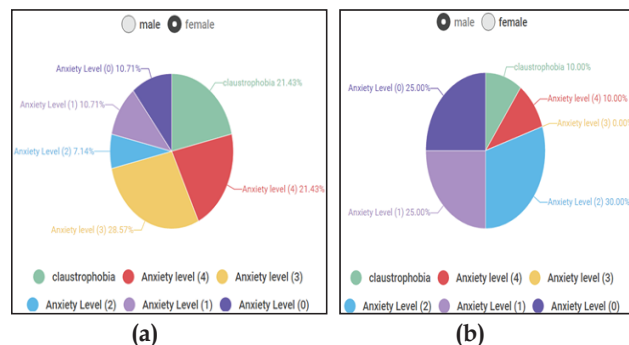


Figure (1) anxiety scale percentages and claustrophobia across sex and age groups where

(a) Female patients, (b) Male patients.

It can be clearly seen that first and second anxiety scales groups show no functional relation between there systolic pressure and the experiment. While patients with higher anxiety scale with level 3 there are obvious upwards. Figure (2, a) Illustrates the statistically significant difference concerning to systolic BP with patients with high anxiety levels and claustrophobic group with (mean \pm standard deviation) in the pre and post MRI scan whereas levels of anxiety and claustrophobia t -test=3.007 and, P value <0.05). Figure (2,b) shows the difference (mean \pm standard deviation) of diastolic BP in accordance to the anxiety scale and claustrophobia pre and post the MRI scan, in different measures, considering the different anxiety level observed.

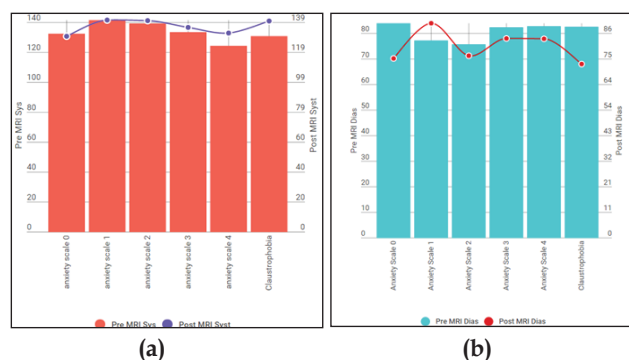


Figure (2): Association of blood pressure with anxiety levels and Claustrophobia. (a) The relationships of pre- and post MRI scans systolic BP with 5 groups (b) the relationships of pre- and post MRI scans diastolic BP with 5 groups.

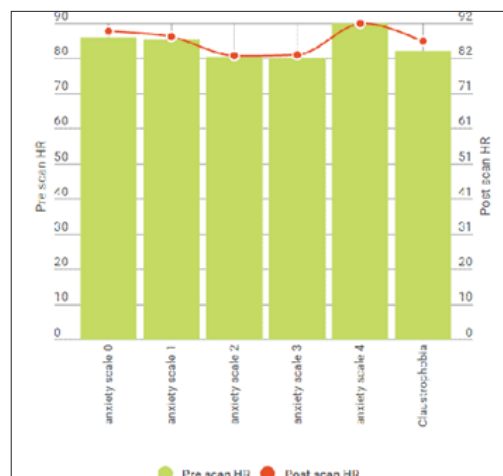


Figure (3) Association of heart rate with anxiety levels and Claustrophobia plots with pre and post MRI scan

Figure (3) shows the HR of volunteers in the two mentioned periods. We can detect that the HR virtually does not change as a function of claustrophobia or anxiety scales. There is a minor alteration after MRI scan for the non-noxious with increasing the difference till plunge in the group 3 and returning to rise again with higher anxious and claustrophobic patients. This is non-significant changes according to the difference of (mean \pm and standard deviation).

Discussion

The purpose of this research was to study the relationship between the influence of anxiety and claustrophobia with the blood pressure and heart rate before and after MRI scan. This section discusses the findings that were observed with the psychophysical questionnaire and vital signs correlation. The study shows three major results about the influence of the anxiety and claustrophobia on; systolic, diastolic blood pressure and heart rate. The authors made this MRI developed anxiety scale in relay on Corah NL. to diagnose the state of anxiety in dental patients [14]. This scale was developed to our study because of the capability to be applied in count for helping as a predictor for the workers in the MRI room in compare with other anxiety scales. Patients during MRI scan are commonly undergoing negative emotions. The unfamiliar environment, unknown staff and noises can incite fear and anxiety as result they cannot complete the scan or motion artifacts will appear in the images [15].

The description provided by radiological technologist and researcher before and after MRI scan

is efficient for those patients who presented with mild and non-anxiety level, because we noticed reduction of the patients expectation in relation to the scan performed. This finding reinforces the importance of MRI questionnaire to verbalize so early and safe to the patient about the procedures to be performed in each visit, thus avoiding the fear of the unknown procedures of the scan [6,16].

Keen patients to MRI scan with no anxiety or mild level are found more with younger or educated patients. The result suggests that it is associated with the fact the patients relate the MRI scan to the feeling of fear and anxiety, perhaps to have previous negative experience [17]. Most of the previous studies on MRI associated anxiety and claustrophobia focus on psychological aspects [18]. So this pilot study as our knowledge is the first in related with main vital signs in MRI procedures. Thus, the questionnaire had been prepared to evaluate the patient reactions and to place psychological strategies to reduce the anxiety of the same. In this study, the volunteers received information about the steps and the procedures that were performed, as recommended by other authors [5,12].

The percentages in Figure (1) of this study were approved by other researchers which explained this variation in relation to different reasons for example: the age, gender, and circumstances, background and even gene defect [19]. The different individuals have different thresholds for the anxiety sensitivity [20]. Similarly, the difference claustrophobic reactions of MRI patients are affected by body part examined, gender, and positioning in the MRI tube [21].

The pie charts illustrate the primary percentages of having different anxiety scale and claustrophobia. It is clear that the main factor influencing their various percentages is the gender difference.

Female had higher anxiety levels about 21 % for claustrophobia and anxiety level scale 4; also around 28 % have anxiety scale 3. This result was also found by other study [22]. While the male have lower anxiety level but, the total percentage of less anxious and feared female are fewer than 25%.

In comparison, male percentage shows proportion of the high anxiety scale 4, 3 and claustrophobia of 10%, 0%, and 10% respectively. The reasons might

belong to anxiety and phobia occurs more often in female than in male [23]. Reckelhoff, et al have shown that BP is less in woman than in men at similar ages. After menopause period, conversely, the BP increases in female more than in male [24].

Sledge and Vinger-hoets; approved interoperation which the first phase of reaction with anxiety and specific types of phobia which leads to increase the systolic pressure and heart rate [25]. Supporting to this study, figure (2-a) illustrates the actual (mean±) values in the five levels groups. Where after the third anxiety level there were significant change between the systolic pressure and the anxiety and rising gradually with moderate, exacerbated levels and claustrophobia. In result, the systolic mean values of the groups raising influence by two factors: the increase in anxiety scales and the present of claustrophobia.

In contrary, significant changes in the diastolic and HR were not found in relation to the five groups during the MRI examination. These results were in the same line, with previous pilot study were found the phobia, anxiety, and panic attack do not associated with diastolic and heart rate [26]. In spite of the gigantic improvement in the aspects of arterial hypertension detection numerous fields of blood pressure measurement require further rigorous study, such as blood pressure measurement in distinct clinical situation and population [10].

Conclusion

The study results revealed that there was a substantial relation between systolic to anxiety and claustrophobia. On the other hand, the diastolic and heart rate did not change before and after the MRI scan in relation to the anxiety levels recorded with the patients. It is recommended that further research should be conducted in this field. Therefore, according to these results, patient with high blood pressure and/or heart diseases measures his blood pressure before the scan and calm he down should be a mandatory technical step before MRI.

Conflict of interest: none

Source of findings: self-findings.

Ethical clearance: none

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Salmonella Paratyphi B Meningitis in an Infant; The First Report in Indonesia

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How to cite this article: Prastiya Indra Gunawan, Riza Noviandi et al Salmonella Paratyphi B Meningitis in an Infant; The First Report in Indonesia. Volume 22 | Number 3 | July-September 2022

Abstract

A 7-month-old, previously healthy Indonesian baby was referred with chief complaint of several general seizures, fever and diarrhea. The baby was irritable with positive pathological reflexes. Head CT scan suggesting meningoencephalitis. CSF culture resulted Salmonella spp and biochemical test supported Salmonella paratyphi B. The baby was treated with ampicillin and chloramphenicol for two weeks. The patient was discharge without neurological complication. Salmonella paratyphi B in infant is a rare entity and it is the first case that ever reported in Indonesia. Proper management with adequate antibiotics resulted satisfactory outcome.

Keywords: Salmonella Paratyphi B, meningitis, infant

Introduction

Meningitis is described as inflammation of the membranes that encompass the brain and spinal cord¹. Salmonella meningitis is an uncommon form and approximately 1% or less of acute bacterial meningitis in developed countries. The first case of Salmonella meningitis stated by Ghon in the year 1908 was due to Salmonella Paratyphi B^{2,3}.

The previous reports suggested that Salmonella meningitis was associated with a high mortality rate of up to 50-70% and high prevalence (50-90%) of

morbidity presenting variable complications⁴. It is associated with significant neurological sequelae in those who survive, and a high relapse rate^{4,6}.

The purpose of this paper is to report a rare case of Salmonella paratyphi B meningitis infection in infant that successfully treated with conventional therapy.

Case Report

A 7-month-old, previously healthy Indonesian male baby was referred to Soetomo Hospital, Surabaya, Indonesia with chief complaint of several general

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seizures that lasted for 10-15 minutes. The baby presented with 5 days fever, diarrhea and stable hemodynamic. No history of ear discharge and thypoid fever in the family. The baby was anemic and irritable. Meningeal sign was negative, otherwise pathological reflexes were positive in both extremities.

Complete blood count showed white blood cells of 29.810 cells/mcL, haemoglobine level of 8.7 g/dl, platelet count of 405.000 cells/mcL and C-Reactive Protein was 136.65 mg/dL. Head CT Scan with contrast showed leptomenigeal and gyral enhancement on bilateral temporoparietal lobe suggested of meningoencephalitis.

The liquor cerebrospinal analysis was cloudy in appearance, cell count was 4558/ μ L consisting of 53.5% polymorphonuclear cell, nonne and pandy test were positive, decreased glucose concentration (11 mg/dl) and increased total protein (97 mg/dl). Cerebrospinal fluid (CSF) culture resulted *Salmonella spp* in which sensitive with cefotaxime, ampicillin and chloramphenicol. Biochemical tests demonstrated that indole was negative and citrate was positive. Triple sugar iron produced abundant H_2S as the characteristic of *Salmonella Paratyphi B*. Blood culture resulted no growth of bacteria.

Based on the antibiotic sensitivity test, the patient put on ampicillin 100 mg/kg/day intravenously and chloramphenicol 50 mg/kg/day intravenously for two weeks. Phenytoin was added to control the seizures. The baby condition was improve, and then discharge in a good condition after being hospitalized for three weeks. No complication was observed. The ambulatory EEG was normal.

Discussion

The clinical signs and symptoms of bacterial meningitis in children vary depending on the age of the child and duration of disease. Classical signs of meningitis such as nuchal rigidity, bulging fontanelle, photophobia, and a positive Kernig's or Brudzinski's sign (usually in children older than 12 to 18 months) may also be present. Focal neurological signs may also be observed, as well as reduced level of consciousness. In our case, the baby was irritable, fever with positive pathological reflexes suggesting an intracranial infection.

From CSF *Salmonella spp* was isolated. Manual biochemical test showed the species was *Salmonella*

Paratyphi B. CSF analysis through lumbar puncture (LP) is the most important laboratory diagnostic test, and routine laboratory techniques can usually identify the pathogen. In infants and young children globally, *Streptococcus pneumoniae*, *Haemophilus influenzae* type b and *Neisseria meningitides* are the most common causes of bacterial meningitis^{7,8}. *Salmonella* meningitis is an unusual manifestation of salmonellosis. Humans acquire *Salmonella* by ingestion of contaminated water or food, furthermore gastroenteritis remains the most common clinical presentation. Intracranial infections follow bacteremia, which occurs as a result of migration of the organisms across the gastrointestinal tract into the bloodstream⁹. A CDC report showed that a third of patients yielding *Salmonella* isolates from the CSF were younger than 3 months, besides more than half were younger than 1 year. Many reasons, including an undeveloped blood brain barrier and a inadequately developed immune system, have been postulated for why young children are most susceptible, but no single explanation is adequate⁹.

Treatment of salmonella meningitis is very difficult, and has never been standardized⁵. *Salmonella* is being a facultative intracellular micro-organism. The drug penetration is inadequate, which may result in the progression of the infection and also, there is an evidence of an increasing resistance against the conventionally used antibiotics such as ampicillin, chloramphenicol, cotrimoxazole and cephalosporins. The treatment protocol for salmonella meningitis can be adjusted depending upon the sensitivity pattern of the organism and the clinical response to the antibiotic in use. Duration of treatment varied between two to eight weeks^{2-4,10}. In our case, combination of chloramphenicol and ampicillin for 14 consecutive days resulted in a good response.

The prognosis and the course of *Salmonella* meningitis is varies. *Salmonella* meningitis tends to cause a high percentage of neurological abnormalities. Coma on admission is related with a worse prognosis than a child presenting with irritability or lethargy alone⁶. In our case, the baby was fully recovered and had no obvious complication after the treatment.

Summary

Meningitis in infants is rarely caused by *Salmonella paratyphi B*. This is the first case that ever reported in Indonesia. The children who experienced *Salmonella*

meningitis may suffered from severe neurological complications, otherwise some previous reported cases showed a significant improvement. Proper management with adequate antibiotics in our case resulted satisfactory outcome.

Acknowledgement: The authors would appreciate to Rizka Yulianti for the contribution of managing the patient.

Conflict of Interest

The authors expressly declare there is no conflict of interest

Ethical clearance

This is a case report and inform consent was approved and taken from the parents.

Source of funding

Self funding

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