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Scientific research on management of Hypovolemic shock among dental students

Type of study: Survey

Running title:Awareness on management of Hypovolemic shock

Authors

Amit Kumar Singh

Graduate Student,

Department of Prosthodontics,

Saveetha Dental College and Hospitals,

Saveetha Institute of Medical and Technical Sciences,

Saveetha University, Chennai- 600077,

Tamil Nadu, India.

Email: 151701056.sdc@saveetha.com

Revathi Duraisamy

Senior Lecturer

Department of Prosthodontics,

Saveetha Dental College and Hospitals,

Saveetha Institute of Medical and Technical Sciences,

Saveetha University, Chennai- 600077,

Tamil Nadu, India.

E.mail:revathid.sdc@saveetha.com

Dhanraj M. Ganapathy

Professor and Head

Department of Prosthodontics

Saveetha Institute of Medical and Technical Sciences

Saveetha University

Chennai-77

Email id: dhanarajmganapathy@yahoo.co.in

Phone number: 9123554502

Corresponding Author:

Revathi Duraisamy

Reader,

Department of Prosthodontics,

Saveetha Dental College and Hospitals,

Saveetha Institute of Medical and Technical Sciences,

Saveetha University, Chennai- 600077,

Tamil Nadu, India.

E.mail:revathid.sdc@saveetha.com

Abstract

Background: Shock is defined as the state in which profound and widespread reduction of effective tissue perfusion leads first to reversible, and then if prolonged,to irreversible cellular injury.It is caused by a loss of intravascular fluid which is usually whole blood or plasma. Whole blood loss from an open wound is an obvious cause for hypovolemic shock.Hypovolemic shock is associated with disorders that cause an underlying hemodynamic defect of a low intravascular volume and a reduction in myocardial contractility.It is a consequence of decreased preload due to intravascular volume loss. The decreased preload diminishes stroke

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volume, resulting in decreased cardiac output (CO).The systemic vascular resistance (SVR) is typically increased in an effort to compensate for the diminished CO and maintain perfusion to vital organs.

Aim: To assess and create awareness on management of hypovolemic shock among dental students.

Material and Methods: A questionnaire of 10 questions based on creating awareness on management of Hypovolemic shock among dentists,collected data were tabulated and statistically analyzed.

Results: The total sample of this study was 150 participants.55.56% were male and 44.44% participants were females. 78.70% of the study population were aware of types of hypovolemic shock.38% participants responded as tachycardia was the first sign of shock.Chi Square test was done, it was found to be statistically significant since p value-.0.001 ($p<0.05$)

Conclusion: Within the limits of the study it was found that dental students are well aware of hypovolemic shock,they are also aware of clinical signs and symptoms of hypovolemic shock. The limit of this study was found that most of the participants were aware of hypovolemic shock and the first sign of hypovolemic shock and their management.This survey helped in creating awareness of management of hypovolemic shock.

KEY WORDS; Hypovolumic shock, cardiac output, shock, systemic vascular resistance,innovation.

Introduction

Shock is defined as the state in which profound and widespread reduction of effective tissue perfusion leads first to reversible, and then if prolonged,to irreversible cellular injury(1).It is classified as hypovolemic/hemorrhagic shock, cardiogenic shock,obstructive shock, and distributive shock.Hypovolemic shock is defined as the rapid fluid loss or blood loss which results in multiple organ dysfunction due to inadequate circulating blood volume and perfusion(2).It is caused by a loss of intravascular fluid which is usually whole blood or plasma. Whole blood loss from an open wound is an obvious cause for hypovolemic shock(3). An intravascular volume depletion may occur with any condition which leads to excessive extracellular fluid loss with or without loss of plasma protein. Hypovolemic shock is secondary to hemorrhagic shock (rapid blood loss) which is rare but causes serious complications and mostly occurs in obstetrical situations.

Hypovolemic shock is associated with disorders that cause an underlying hemodynamic defect of a low intravascular volume and a reduction in myocardial contractility.It is a consequence of decreased preload due to intravascular volume loss. The decreased preload diminishes stroke volume, resulting in decreased cardiac output (CO)(4).The systemic vascular resistance (SVR) is typically increased in an effort to compensate for the diminished CO and maintain perfusion to vital organs. The early stage of recognition and intervention will help to prevent death.Hypovolemic shock is caused by sudden blood or fluid losses within your body. The most common clinical causes of hypovolemic shock are hemorrhage, vomiting, diarrhea, severe burns, and excessive sweating.Since arterial blood pressure (BP) is dependent on the CO and SVR, marked reduction in either of these variables without a compensatory elevation results in systemic hypotension.

The basic goal of circulatory shock therapy is the restoration of effective perfusion to vital organs and tissues before the onset of cellular injury(5). There are three goals in an emergency with hypovolemic shock including maximizing oxygen delivery, control further blood loss, and fluid resuscitation.The most effective means of restoring adequate circulation are by rapid infusion of volume expanding fluids(6,7).Our team has extensive knowledge and research experience that has translate into high quality publications(8–22)

The aim of this study is to assess and create awareness on management of Hypovolemic shock among dental students.

Material and Methods

We designed a survey that contained questions concerning hypovolemic shock and their effect on patients. It consisted of 10 questions that assessed the following circumstances- Are you aware of different type of shock,What is first sign of shock,What is ideal blood volume in an adult with an ideal weight of 70kg.An email invitation to complete an electronic form of survey through survey planet was sent to the college students and local geographical

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area.A total 100 responded were collected .The data was collected and interpreted as a bar graph. A total number of hundred participants of Indian origin have taken the survey.Data was analysed by using statistical methods and the results were plotted as graphs and tables.

Results and Discussion

In this study out of 150 participants.55.56% were male participants and 44.44% were female participants(**Figure-1**).In this study,it was observed that 78.70% were aware of different types of shock followed by 21.30% are not well aware of different types of hypovolemic shock (**figure-2**).38% participants were responded as tachycardia as 38% first sign of symptoms followed by High BP with 28% responses(**Figure 3**).60% of participants responded as crystalloid solution and 40% of participants were as colloid solution(**Figure 4**). The association between year of study and the awareness of different types of shock" on Chi Square analysis it was found to be statistically not significant since Pearson Chi-Square value-.833 p value-.14 ($p>0.05$) even though it is not significant third year participants were more aware of different type of shock(27.00%) followed by Fourth year participants(19.00%)(**Figure 5**). Supportive study done by sharven et al state that many dentists are aware of hypovolemic shock(23).In our study shows that tachycardia were first sign for hypovolemic shock followed by High BP. The association between years of study and the question: what is the first sign of shock? It was found to be statistically significant since Pearson Chi-Square value-.833 p value-.0.001 ($p<0.05$) it is significant third year participants responded as tachycardia was the first sign of shock(15.00%) followed by final year respond as High BP was first sign of shock(13.00%)(**Figure 6**). The association between years of study and the responses of question"What solution do you give for hypovolemic shock? It was found to be statistically not significant since Pearson Chi-Square value-0.614 p value-.14 ($p>0.05$) even though it is not significant third year participants were responded for crystalloid solution(19.00%) **(Figure 7).**

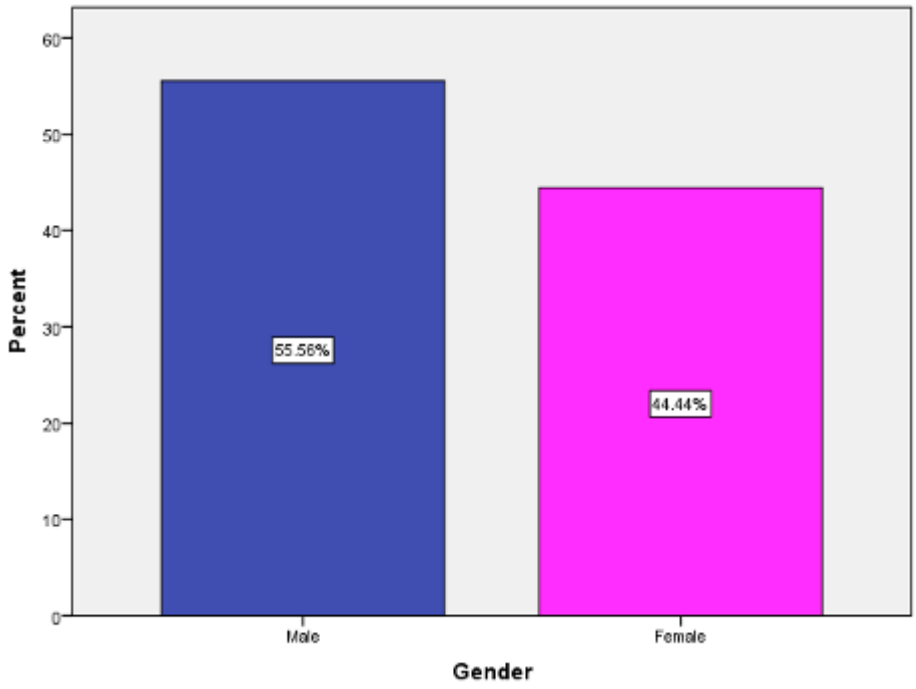

Figure 1: Bar graph representing the frequency participants took surveys. It shows that 55.56% were male and 44.44% were female.

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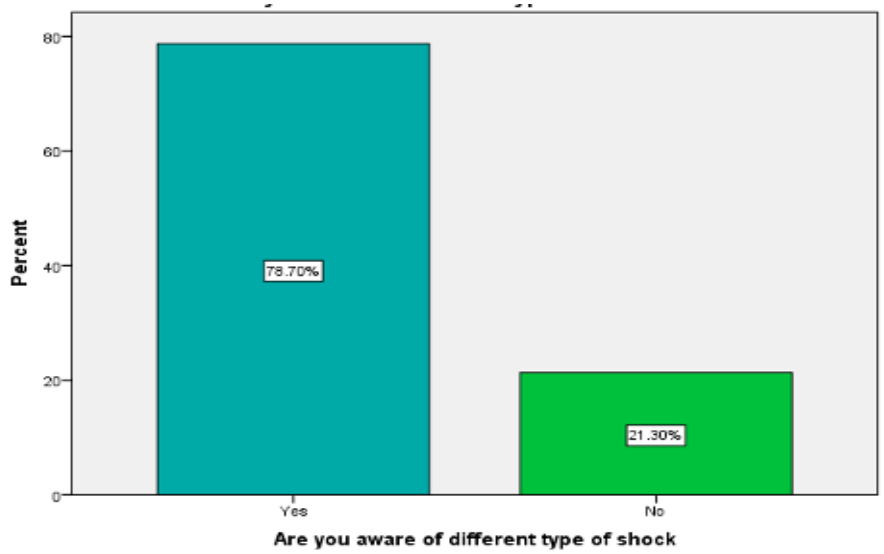

Figure 2: Bar graph representing the frequency participants who are aware of different types of shock.It shows that 78.70% were aware of different types of shock and 21.30% are not aware of different types of shock.

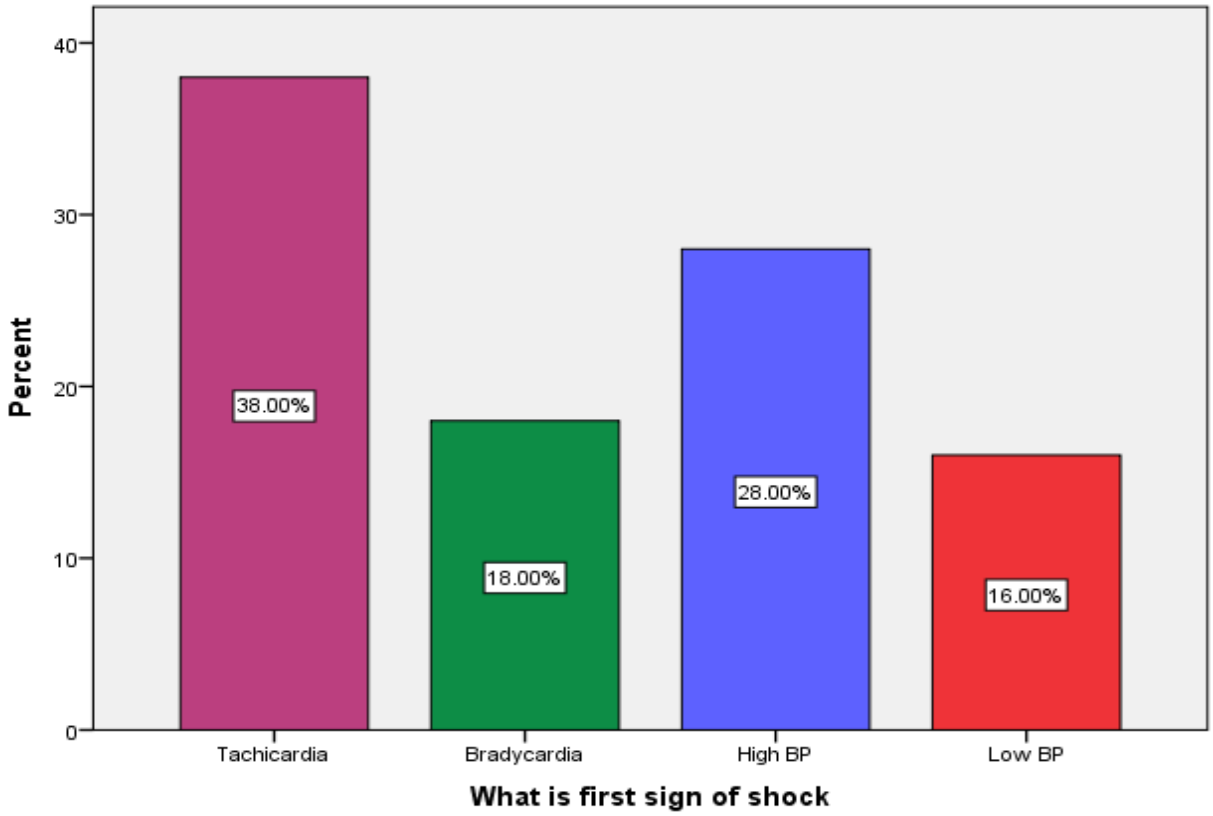

Figure 3: Bar graph representing the frequency participants with questions asked what is first sign of shock.It shows that 38.00% were responded as tachycardia was a first sign of shock followed by 28.00% were responded as High BP was a first sign of shock.

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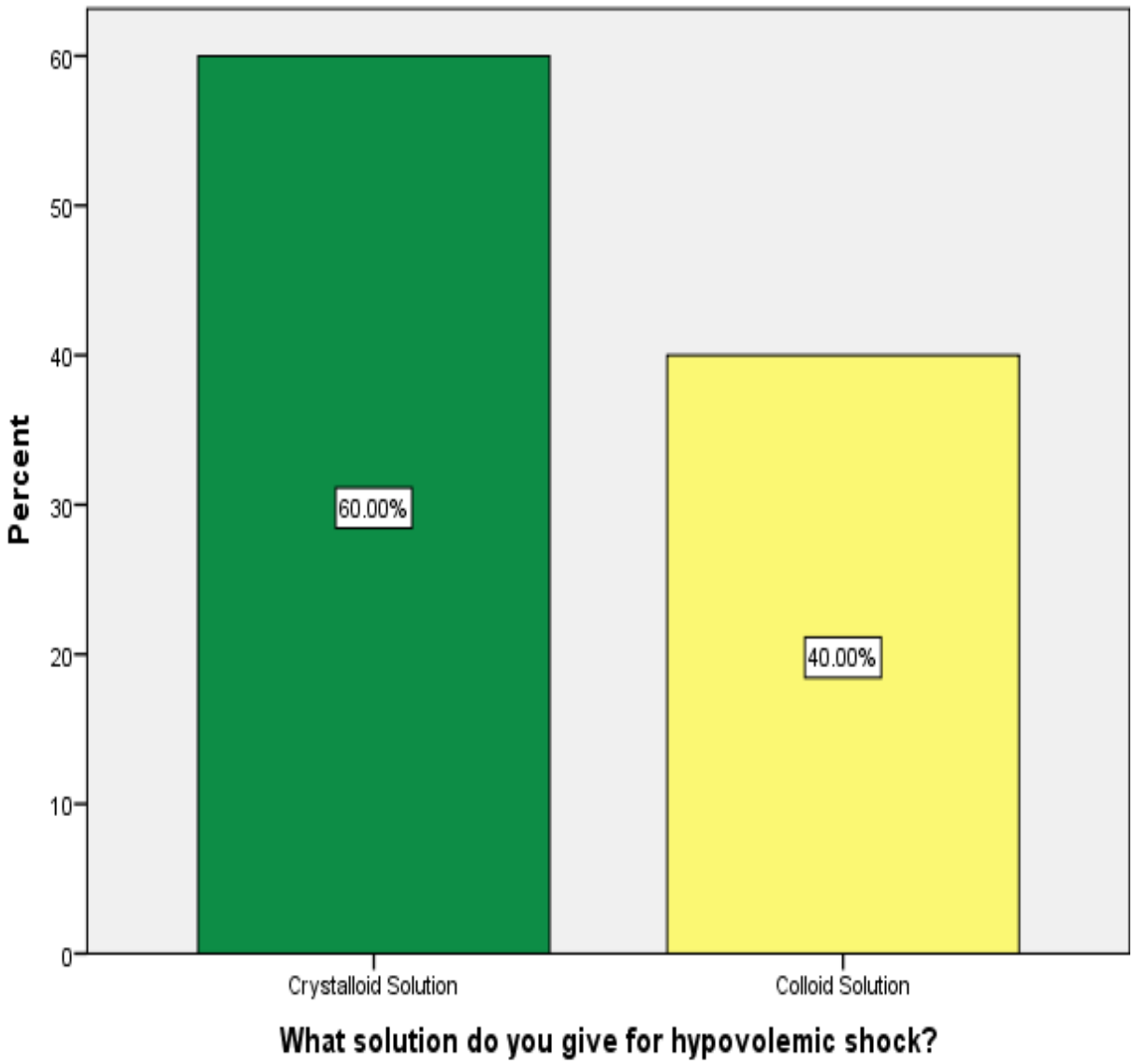

Figure 4: Bar graph representing the response of the question"What solution do you give for hypovolemic shock?.It shows that 60.00% were responded for crystalloid solution and 40.00% for colloid solution.

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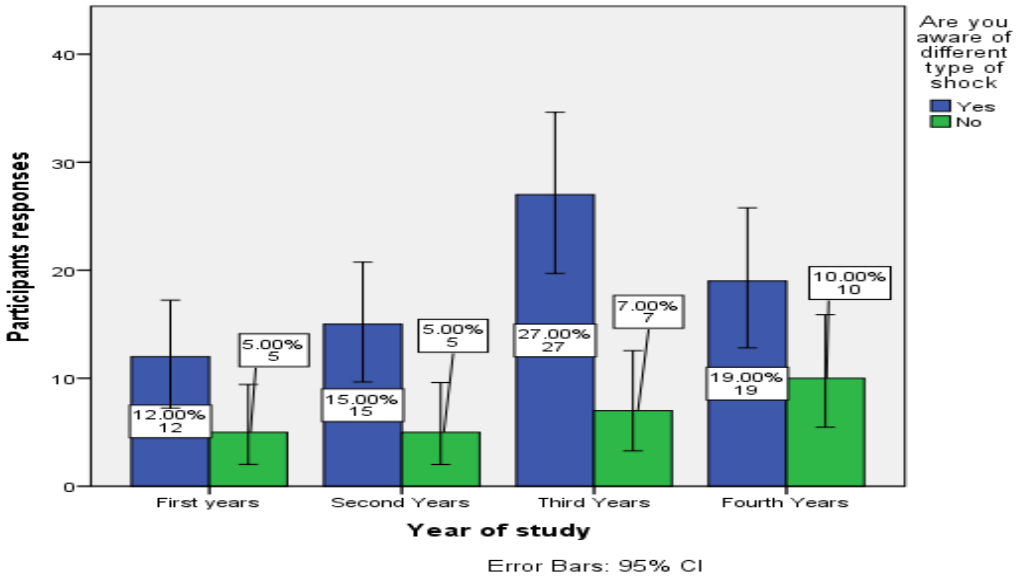

Figure 5: This bar graph represents the association between Year and Awareness of hypovolemic shock. X axis represents years of study participants and Y axis represents the responses of the question"Are you aware of different types of shock". Blue colour denotes yes ,green colour denotes no. Chi Square test was done, and the association between year of study and the responses of question was found to be statistically not significant since Pearson Chi-Square value-.833 p value-.14 ($p>0.05$) even though it is not significant third year participants were more aware of different type of shock(27.00%) followed by Fourth year participants(19.00%).

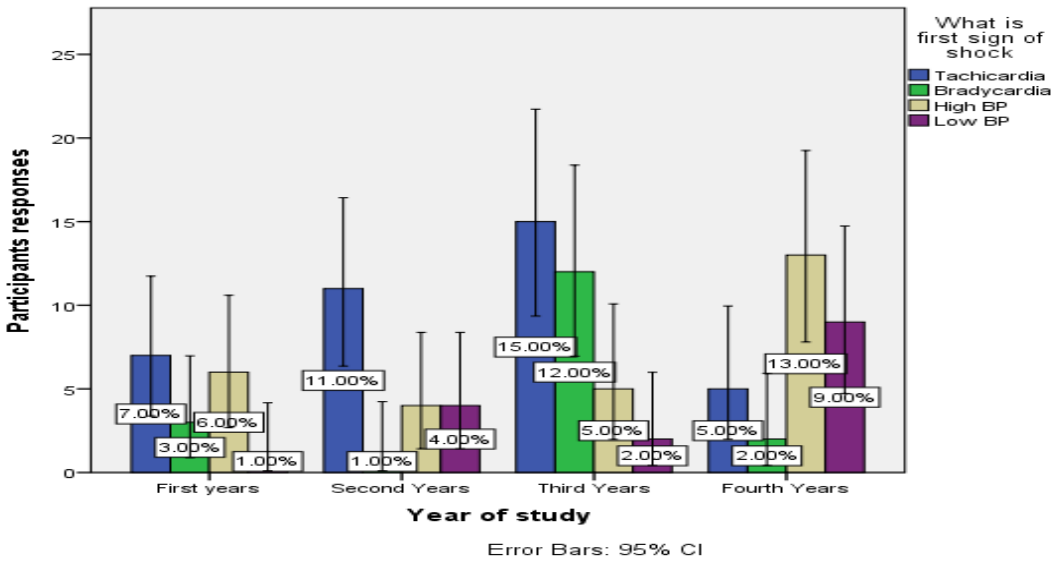

Figure 6: This bar graph represents the association between Year and first sign of shock . X axis represents years of study participants and Y axis represents the responses of the question"What is the first sign of shock". Blue colour denotes tachicardia ,green colour denotes bradycardia grey colour denotes High BP and purple colour denotes Low BP. Chi Square test was done, and the association between year of study and the responses of question was found to be statistically significant since Pearson Chi-Square value-.833 p value-.0.001 ($p<0.05$) it is significant third year

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participants responded as tachycardia was the first sign of shock(15.00%) followed by final year respond as High BP was first sign of shock(13.00%).

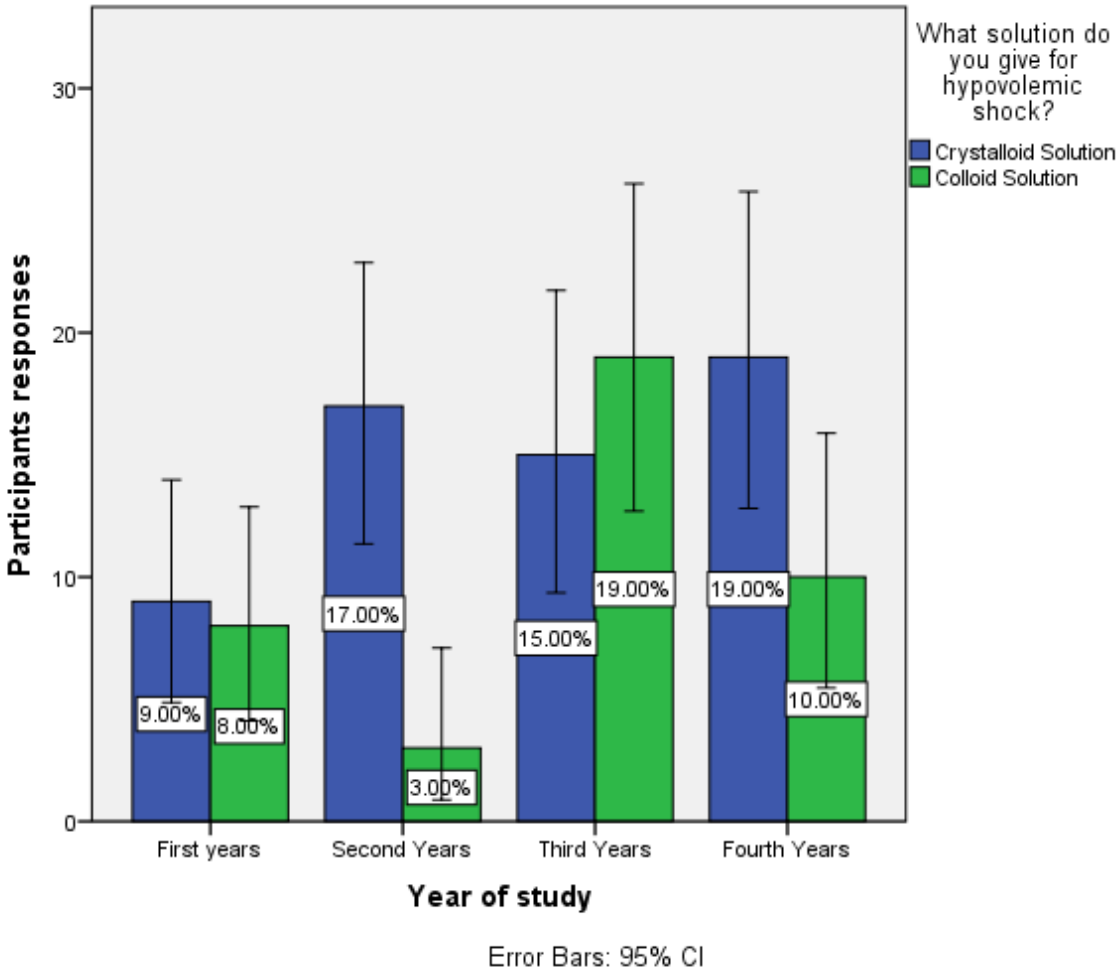

Figure 7: This bar graph represents the association between Year of study and responses of questions. X axis represents years of study participants and Y axis represents the responses of the question"What solution do you give for hypovolemic shock". Blue colour denotes crystalloid solution ,green colour denotes colloid solution. Chi Square test was done, and the association between year of study and the responses of question was found to be statistically not significant since Pearson Chi-Square value-0.614 p value-.14 ($p>0.05$) even though it is not significant third year participants were responded for crystalloid solution(19.00%).

In hypovolemic shock, the volume loss is exogenous or endogenous. Restoration of blood volume is both simple and effective if applied before irreversible tissue damage occurs.The external fluid losses and the internal sequestration will cause reduced venous return and decreased CO. This leads to a set of reflex responses designed to maintain the oxygen to critical organs such as the brain and heart. However, these responses may limit perfusion of other organs such as the gut to produce necrosis. The consequences of reduced tissue perfusion are similar in all

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forms of shock.The symptoms can vary with the previous level of organ function, compensatory mechanisms, severity of organ dysfunctions, and the cause of shock syndrome(24).

The symptoms of hypovolemic shock include pallor, tachycardia, hypotension, dyspnea, diaphoresis, tachypnea, cyanosis, faint heart sounds, agitation,mental status changes, pinpoint pupils, cool and clammy skin, lactic acidosis, and poor urine output(25).Right-heart catheterization will usually reveal a low central venous pressure (CVP), pulmonary artery occlusion pressure (PAOP), CO, and mixed venous oxygen content.During spontaneous ventilation, pulsus paradoxus may occur, whereas during mechanical ventilation,the systolic BP only transiently increases during the inspiratory phase followed by a rapid decrease (with a systolic pressure variation of >10 mmHg) being suggested as a method to diagnose hypovolemia in a mechanically ventilated patient with normal pulmonary compliance.The presence of cardiovascular disease,autonomic neuropathy or anemia, or prior treatment with β-adrenergic blockers or calcium channel blockers may worsen the cardiovascular response to blood loss(26).

The diagnostic evaluation should occur the same as resuscitation if the patient is suspected of having shock. Laboratory tests may help identify the cause of shock and early organ failure(27).They should be performed early in the evaluation of undifferentiated shock which include complete blood count with differential, basic chemistry tests (sodium, potassium, chloride, and serum bicarbonate), blood urea nitrogen, creatinine, liver function tests, amylase, lipase, prothrombin time or international normalized ratio, partial thromboplastin time, fibrinogen, fibrin split products or dimer, cardiac enzymes (troponin or creatine phosphokinase isoenzymes), urinalysis with a detailed sediment analysis, arterial blood gas(ABG), toxicology screen, and lactate level(28,29).

Conclusion:

Within the limits of the study it was found that dental students are well aware of hypovolemic shock,they are also aware of clinical signs and symptoms of hypovolemic shock. This survey helped in creating awareness on management of hypovolemic shock.

Acknowledgement

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Author Contribution:-Author 1 carried out the retrospective study by collecting data and drafted the manuscript after performing the necessary statistical analysis,aided in the conception of the topic.**Author 2 and 3** has participated in the study design and has coordinated in developing the manuscript.All the authors have discussed the result among themselves and contributed in the final manuscript.

Conflict of interest-
None

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