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A Study to Assess the Knowledge and Practice of Staff Nurses Regarding Clabsi Bundle

Dhanya Joseph

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Abstract

A non-experimental descriptive study to assess the knowledge and practice about the use of central line associated bloodstream infection care bundle (CLABSI) to prevent central line associated bloodstream infection, among staff nurses working in selected hospitals, Hyderabad, with a view to develop an information booklet with the objectives To assess the knowledge and practice regarding CLABSI bundle,to find out correlation between knowledge and practice among staff nurses, to find out association between knowledge and practice among staff nurses with their selected demographic variables, to develop information booklet on CLABSI bundle for staff nurses. Research design selected for the present study was non experimental descriptive research design. A structured questionnaire was used to collect the data from the staff nurses and an observational CLABSI bundle checklist was used to assess the practice score of the CLABSI bundle practices.Purposive sampling technique was used for the selection of sample. Total sample size for the study was 60. Majority of the staff nurses had below average knowledge on CLABSI bundles that is 45(75%) having below average knowledge, whereas 15 (25%) demonstrated average knowledge. The result of the study is majority of the staff nurses had below average practice to CLABSI bundle that is 48 (80%) scored below average practice scores. 11(18.6%) staff nurses were in average practice scores, whereas 1(1.7%) staff nurse scored above average practice scores. The study shows that there is moderately positive correlation between knowledge and practice among staff nurses, (r=0.4). The study shows that there is no significant association between knowledge and practice regarding CLABSI bundle among staff nurses with selected demographic variables. An information booklet was provided to all intensive care nurses, regarding knowledge and practice of CLABSI bundle and advised to implement CLABSI bundle checklist wherever needed in order to prevent central line associated bloodstream infection.

Keywords: CLABSI bundle checklist wherever needed in order to prevent central line associated bloodstream infection.

Introduction

Central Line Associated Bloodstream Infections (CLABSI) is defined as a laboratory-confirmed bloodstream infection (not related to an infection at another site) where a central line was in place within 48 hour period before the development of bloodstream infection. Of all the health care associated infections, CLABSIs are the most expensive; accounting for 46,000 per case in world and in India the rate being 7.9 per 1000 central line-days that is 19,030 as per 2018 survey. A vast majority of the cases are preventable through proper aseptic techniques, surveillance, and management strategies. In many hospitals in Canada, United Kingdom and United states these CLABSI bundles are in practice since many years. In India, many multispecialty hospitals have implemented these bundles, since 2010. Especially those hospitals are accredited with National Accreditation Board for Hospitals and Health care Providers (NABH) and Joint Commission International (JCI) standards.

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Need for the Study

Central Venous Catheter (CVCs) is widely used in critically ill patients throughout the developed world. Approximately 5 million CVCs are used each year. Each year, approximately 80,000 CVC-associated Blood Stream Infections (BSIs) occur in patients in ICUs and up to 250,000 occur throughout the health care system. Increased use of CVC over the past 20 years has been associated with at least a doubling of resultant CVC-associated bacteremia. According to a survey conducted in the year 2017 by International Nosocomial Infection control Consortium (INICC) CLABSI rate percentile in India per year is 75 – 90%. A study was conducted on ICU nursing staff about the catheter related blood stream infections. After the implementation of the education module, the number of primary blood stream infections fell to 26 in 7044 catheter days (3.7 per 1000 catheter days), a decrease of 66%. Recent prevalence study conducted on 2014 by CDC there are 28% of acute care patients had a central line 14% of HAIs were BSI. All BSIs identified were CLABSI. The study estimated there are 41,000 CLABSI annually hospital-wide and in that 18,000 CLABSI annually in ICUs. Despite of broad implementation of a bundle strategy aimed at preventing central line associated blood steam infections rates in many hospitals, gaps exist between awareness of the evidence based guidelines into daily practice. I could feel that a study is required to assess the staff nurses knowledge and practice on usage of CLABSI bundle and it may in turn help me to develop an information booklet for the staff nurses.

Review of Literature

***Mohammad Al Qadire RN, PhD* (2017)** conducted a descriptive cross-sectional survey evaluated Jordanian oncology nurses' knowledge of the guidelines for preventing central venous catheter–associated infection. 170 oncology nurses were selected using purposive sampling technique; a structured questionnaire was used based on the Guidelines for the Prevention of Intravascular Catheter-Related Infections. Of the 170 oncology nurses, 133 completed the study questionnaire (response rate, 78%). Poor knowledge was evident from the very low mean total scores and the low percentage of correct answers for each item in the questionnaire.

***Maria Rosaria Esposito*[1], *Assunta Guillari*[2] (2017),** conducted a cross sectional study on Knowledge, attitudes, and practice on the prevention of central line-associated bloodstream infections among nurses in oncological care. Random sampling was used to select the samples. 335 nurses participated in the study. A questionnaire was self-administered. The vast majority of the 335 nurses answered questions correctly about the main recommendations to prevent CLABSIs (use sterile gauze or sterile transparent semi permeable dressing to cover the catheter site, disinfect the needleless connectors before administering medication or fluid, disinfect with hydrogen peroxide the catheter insertion site, and use routinely anticoagulants solutions). Nurses aged 36 to 50 years were less likely to know these main recommendations to prevent CLABSIs, whereas this knowledge was higher in those who have received information about the prevention of these infections from courses. Nurses with lower education and those who do not know two of the main recommendations on the site's care to prevent the CLABSIs, were more likely to perceive the risk of transmitting an infection. The study concluded that educational interventions should be implemented to address the gaps regarding knowledge and practice regarding the prevention of CLABSIs and to ensure that nurses use evidence-based prevention interventions.

***Neha John* (2016)** conducted a descriptive study to assess the knowledge staff nurses regarding central line associated blood stream infection. The tool for data collection was a structured knowledge questionnaire and 50 staff nurses working in HAHC Hospital, New Delhi, were selected using convenient sampling technique. The findings of the study concluded that majority (96%) of staff nurses had inadequate knowledge and only 4% had adequate knowledge. Thus it can be concluded that most of the staff nurses of HAHC Hospital have inadequate knowledge regarding CLABSI

Statement of the Problem

"A study to assess the knowledge and practice among staff nurses regarding CLABSI (central line associated blood stream infection) bundle in selected hospitals, Hyderabad with a view to develop an information booklet."

Objective of the Study

1. To assess the knowledge and practice regarding CLABSI bundle.
2. To find out correlation between knowledge and practice among staff nurses.
3. To find out association between knowledge

and practice among staff nurses with their selected demographic variables.

4. To develop information booklet on CLABSI bundle for staff nurses.

Hypotheses

H_1: There will be a significant correlation between knowledge and practice of staff nurses regarding CLABSI bundle

H_2: There will be association between knowledge and practice with selected demographic variables.

Methodology

Research design selected for the present study was non experimental descriptive research design. A structured questionnaire was used to collect the data from the staff nurses and an observational CLABSI bundle checklist was used to assess the practice score of the CLABSI bundle practices. The content validity of the tool was obtained from experts in the field of Medicine and Nursing. Written consent were taken from all the participants. Study protocol was approved by institutional review board.

The pilot study was conducted from 21st January 2019 to 26th January 2019 at selected hospital, Hyderabad. Prior permission from the authorities was obtained. The reliability of the tool was tested by using the split – half method and Karl Pearson's formula and the tool was found to be highly reliable (r = 0.9)

The present study was conducted at selected hospital Hyderabad, during a specified period from 1st March 2019 to 11th March 2019. Prior permission from the authorities was obtained. Purposive sampling technique was used for the selection of sample. Total sample size for the study was 60. The conceptual framework for the study was based on audit cycle. The main aim of the model was to assess the knowledge and practice regarding CLABSI bundle among staff nurses and integrating research findings in such a way so as to facilitate the generation of testable hypothesis.

Results

The current study revealed that staff nurses had poor knowledge and practice on CLABSI and its preventive strategies. Majority of the staff nurses had below average knowledge on CLABSI bundles that is 45(75%) having below average knowledge, whereas 15 (25%) demonstrated average knowledge. Majority of the staff nurses had below average practice to CLABSI bundle that is 48 (80%) scored below average practice scores. 11(18.6%) staff nurses were in average practice scores, whereas 1(1.7%) staff nurse scored above average practice scores. The study shows that there is moderately positive correlation between knowledge and practice among staff nurses, (r=0.4). The study shows that there is no significant association between knowledge and practice regarding CLABSI bundle among staff nurses with selected demographic variables. An information booklet was provided to all intensive care nurses, regarding knowledge and practice of CLABSI bundle and advised to implement CLABSI bundle checklist wherever needed in order to prevent central line associated bloodstream infection.

Table 1: Frequency and percentage distribution of staff nurses according to demographic variables

Age in years	Frequency	Percentage
20- 23	0	0
24- 26	0	0
27- 29	0	0
>30	60	100
Gender		
Male	0	0
Female	60	100
Religion		
Hindu	13	22
Muslim	8	13
Christian	39	65
Others	0	0
Educational qualification		
GNM (N)	41	68
B.Sc. (N)	14	23
PB B.Sc. (N)	5	9
M.Sc. (N)	0	0
Total clinical experience		
6 months - 1 year	0	0
1 -5 year	0	0
6 -10 years	6	10
11 years and above	54	90
Area of work		
Surgical ICU	27	45
Medical ICU	33	55
Duration of experience		
0-1 year	4	6.6
2-3 years	3	5
4-5 years	2	3.4
>5 years	51	85

Table 2: Frequency and percentage distribution of staff nurses according to the grading of their knowledge scores.

Knowledge score	Frequency(n)	Percentage (%)
Below average	45	75
Average	15	25
Above average	–	–
Total	60	100

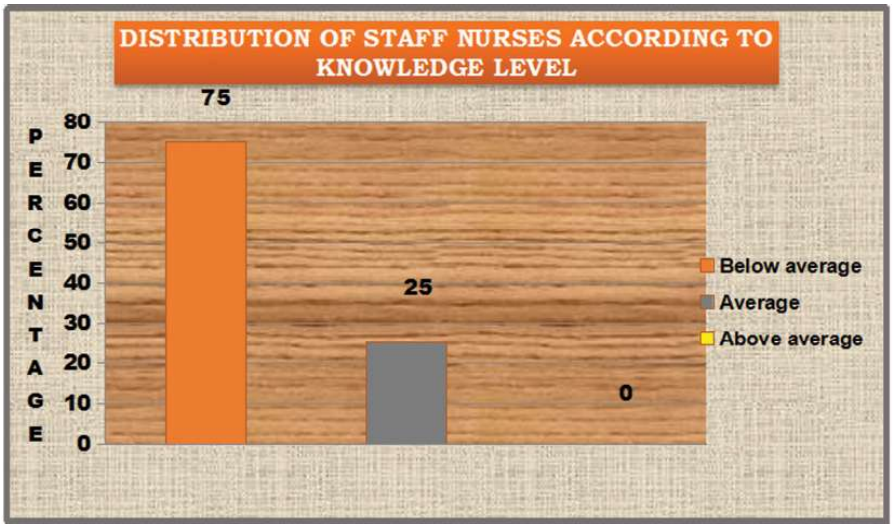

Fig. 1: Percentage of distribution of staff nurses according to knowledge level.

Table 3: Frequency and percentage distribution of staff nurses according to the grading of CLABSI bundle practice scores

CLABSI bundle practice score	Frequency(n)	Percentage (%)
Below average	48	80
Average	11	18.3
Above average	1	1.7
Total	60	100

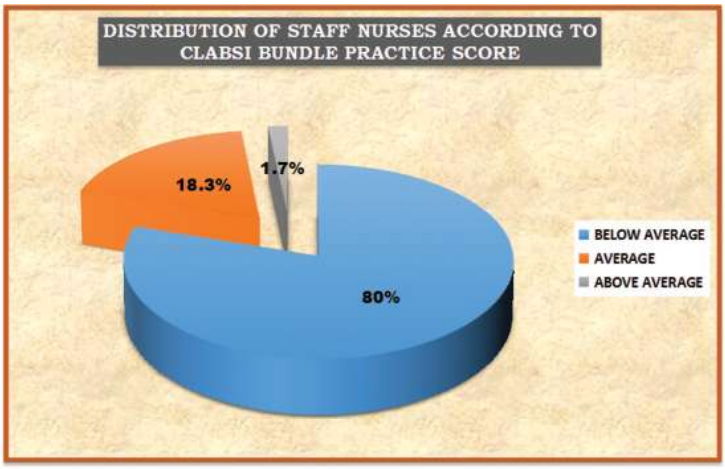

Fig. 2: Percentage of distribution of staff nurses according to CLABSI bundle practice score.

Table 4: Correlation between knowledge and practice of CLABSI bundle among staff nurses working in selected hospital

Variable	r-value	P-value
Knowledge and Practice	0.4	0.05

Table 4: Shows moderately positive correlation between knowledge and practice among staff nurses (r=0.4) at the p value 0.05. Hence we accept the stated hypothesis

H_1: There will be a significant correlation between knowledge and practice of staff nurses regarding CLABSI bundle

Table 5: Over all mean and standard deviation of knowledge and practice of staff nurse regarding CLABSI bundle

Variables	Mean	Standard deviation
Knowledge	9.08	5.76
Practice	2.75	6.14

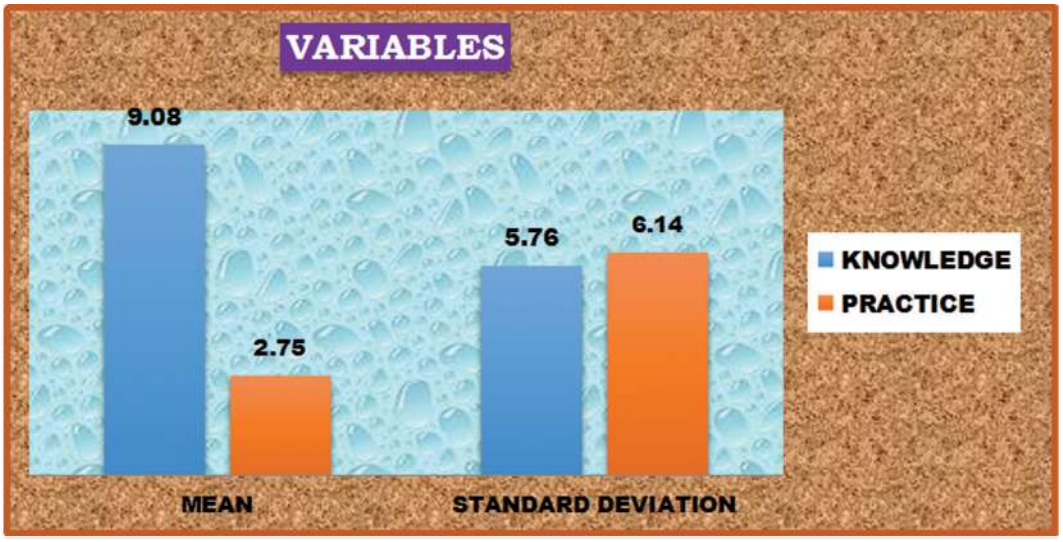

Fig. 3: Over all mean and standard deviation of knowledge and practice of staff nurse regarding CLABSI bundle

Table 6: Chi square values of Knowledge scores of staff nurses with their selected demographic variables

Sl No	Demographic variables	Chi-square value	Degree of Freedom	Table value	Level of significance	Significance
1.	Age	2.06	6	12.59	0.05	NS
2.	Educational qualification	0.6	6	12.59	0.05	NS
3.	Years of experience	1.3	6	12.59	0.05	NS
4.	Area of work	2.7	6	12.59	0.05	NS
5.	Duration of experience in caring the patients with central line	15.8	6	12.59	0.05	S

Table 7: Chi square values of Practice compliance of staff nurses with their selected demographic variables

Sl No	Demographic variables	Chi-square value	Degree of Freedom	Table value	Level of significance	Significance
1.	Age	2.09	6	12.59	0.05	NS
2.	Educational qualification	19.5	6	12.59	0.05	S
3.	Years of experience	0.8	6	12.59	0.05	NS
4.	Area of work	2.3	6	12.59	0.05	NS
5.	Duration of exper-ience in caring the patients with central line	2.2	6	12.59	0.05	NS

Discussion

The present study revealed Majority of the staff nurses I knowledge scores, 45(75%) having below average knowledge, whereas 15 (25%) demonstrated average knowledge and majority of the staff nurses 48 (80%) scored below average practice scores, 11(18.6%) staff nurses were in average practice scores, whereas 1(1.7%) staff nurse scored above average practice scores. The similar study was conducted by Neha John (2016) conducted a descriptive study to assess the knowledge staff nurses regarding central line associated blood stream infection. The tool for data collection was a structured knowledge questionnaire and 50 staff nurses working in HAHC Hospital, New Delhi, were selected using convenient sampling technique. The findings of the study concluded that majority (96%) of staff nurses had inadequate knowledge and only 4% had adequate knowledge. Thus it can be concluded that most of the staff nurses of HAHC Hospital have inadequate knowledge regarding CLABSI.

Limitations

Investigator could experience difficulties in conducting written examination by using a structured questionnaire. Nurses were not interested in spending time after their duty shifts. Gathering nursing staff from different shift duties were also was a herculean task. Since it was a purposive sampling method getting samples was also difficult.

Implication

a. In Nursing Practice

- Nursing professionals working in the hospitals can understand the importance of prevention of central line associated bloodstream infections by practicing and adhering to CLABSI bundle.
- Nurses working in the intensive care units and wards need to practice CLABSI bundle, which will help in prevention of central line associated bloodstream infections.
- Staff nurses needs to enhance their knowledge and skills on prevention of central line associated bloodstream infections through continuous in – service education.
- Posters on CLABSI bundle practices can be displayed within the units.
- Information booklets on CLABSI bundle practices can help staff nurses in improving their knowledge.
- Procedure manuals and structured operating procedures to be updated after review by experts regarding latest guidelines and evidence-based best nursing practices should implement.
- An Innovative teaching drive regarding the newer devices, infection control practices and protocols in Critical Care for central-line insertion and maintenance and centralizing equipment should be undertaken.
- Audits and quality monitors are crucial for better patient outcomes.

b. In Nursing Education

- Nursing education is an integral part of nursing practice, which helps in updating the knowledge of nursing personnel
- Ongoing education should be provided to nursing personnel regarding CLABSI bundles and its practices
- The important role of nursing educator is to educate all nursing staff regarding central line associated bloodstream infections and its prevention by the use of CLABSI bundles
- Once staff nurses master the preventive measures of central line associated bloodstream infections, the number of incidences may come down and there by patient outcome will improve

c. Nursing Administration

- With technological advances and ever growing challenges in nursing, the nurse administrators have responsibility to provide the nurses with adequate educational opportunities
- Nursing administrators should plan and organize in-service education programmes for staff nurses on CLABSI bundles
- Nursing administrators should prepare nurses by providing in depth knowledge regardingcentral line associated bloodstream infections and its prevention
- Nursing administrators should guide and motivate staff nurses in participating certain surveillance activities so that nursing quality will improve further
- The nurse administrators can share new research findings and conduct researches in improving knowledge and practice compliance on prevention of other similar

diseases

d. In Nursing Research

- The study will be a valuable reference for further research.
- The study will motivate researchers who are beginners to conduct similar study on large scale basis and on comparative basis.
- Nurse researchers can develop appropriate health education tools for educating staff nurses on central line associated bloodstream infections preventions.
- The public and private agencies should also encourage researchers in the field of prevention of diseases through improvement in quality services through means of materials and funds.
- The findings of the study would help to expand the scientific body of professional knowledge upon which further research can be conducted.

Conclusion

The Majority of the staff nurses had below average knowledge on CLABSI bundles that is 45(75%) having below average knowledge, whereas 15 (25%) demonstrated average knowledge. Majority of the staff nurses had below average practice to CLABSI bundle that is 48 (80%) scored below average practice scores. 11(18.6%) staff nurses were in average practice scores, whereas 1(1.7%) staff nurse scored above average practice scores. The study shows that there is moderately positive correlation between knowledge and practice among staff nurses, (r=0.4) at the p value 0.05. There was no significant association between knowledge and practice regarding CLABSI bundle among staff nurses with selected demographic variables. An information booklet was developed and distributed among staff nurses, which will help them to improve their knowledge and there by practice on CLABSI bundle and ultimately there will be a definite reduction in central line associated bloodstream infections. The researcher took an added interest to distribute the CLABSI bundle checklist to the selected hospital where the study was conducted in a hope to consider the usage of the checklist regularly to prevent CLABSI's.

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Corona Virus Disease-19 Obesity & Leptin: A Complex Paradigm

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Abstract

The global prevalence of obesity is increasing and recognized as a potential risk factor for viral infections including Coronavirus Disease-19. Morbidity and mortality due to COVID-19 are higher in obesity which is considered a constant state of low-grade inflammatory milieu. Emerging data revealed a fatal connection of obesity with COVID-19 however the underlying mechanism is unclear. Leptin, a non-glycosylated peptide hormone derived from white adipose tissue that assists in metabolism, homeostasis, neuroendocrine, and other physiological functions. Additionally, leptin, as an adipocytokine has pro-inflammatory properties and acts as a connecting link between obesity and host immune responses thus, proliferates the secretion of C-reactive protein (CRP), IFN-γ, TNF-α IL-6, IL-4 and IL-2. This paper aims to address the paramount role of leptin as a potential mediator of inflammation that could exaggerate and worsen the prognosis of COVID-19 in obese individuals. Furthermore, the disproportionate efficacy of the COVID-19 vaccine in obese individuals is also highlighted.

Keywords: Leptin, Obesity, COVID-19, SARS-CoV-2, Vaccine

Introduction

Corona Virus Disease-19 (COVID-19) pandemic is caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). The disease which emerged in the last week of December 2019 has greatly impacted public health worldwide and has brought the world to a standstill.[1] As of 20 February 2022, the number of confirmed cases has exceeded 422 million and resulted in more than 5.8 million deaths globally (https://www.who.int/ accessed on 20 February, 2022). Morbidity and mortality due to SARS-CoV-2 are higher in people with underlying conditions such as obesity, diabetes, hypertension, stroke, cardiovascular, and chronic lung diseases.[2] The global prevalence of obesity is increasing and recognized as a critical factor for viral infections.[3-5] Emerging literature revealed a fatal linkage between obesity and COVID-19 severity.[6,7]

Obesity and overweight increase the risks of SARS-CoV-2 infection, thus requiring hospitalization and aggressive treatment in intensive care units (ICUs).[8,9] The preliminary findings from China and USA suggest that 70–90% of COVID-19 cases admitted to ICUs were overweight.[10] Moreover, the prevalence of acute respiratory distress syndrome (ARDS) was significantly greater among overweight and obese individuals.[11] Due to the variability in nature, obesity contributes to various respiratory diseases, including pulmonary hypertension, ARDS, and pneumonia. These respiratory diseases strike the lungs and turn out to be the most typical cause of mortality in the obese individual affected with SARS-CoV-2.[12]

Obesity is considered a low-grade inflammatory condition that abnormally increases adipose tissue contents which secrete dozens of adipokines mainly leptin, resistin, adiponectin, visfatin, chemerin, tumor necrosis factor (TNF)-α and interleukin (IL)-6.[13-15] Among these adipokines, leptin is widely studied and has shown pro-inflammatory as well as pro-atherothrombotic effects in humans.[16] Recently, a potential connection and underlying mechanism explaining the effect of obesity on the worst outcomes of COVID-19 have been elucidated and leptin as a target molecule has received the most attention.[10,17] However, at present, data on leptin dysregulation in COVID-19 patients are scarce and needs more extensive population-based research studies that would further explore the treatment strategies targeting leptin dysfunction among COVID-19 patients.

Obesity and Leptin Functions in Humans

Obesity is defined as a complex, multifactorial disease that represents the excessive accumulation of white adipose tissue that impairs human health to a greater extent.[18] Obesity is now becoming a global health problem as its worldwide prevalence has nearly doubled for the last 3 decades.[19] This rising prevalence of obesity has reduced the quality of life, and is found to be associated with the leading cause of mortality and extrapolating health care costs globally.[20,21] The aggregation of fat in adipose tissues especially in white adipose tissue (WAT) in obesity favours the secretion of high levels of leptin levels and lowers the secretion of adiponectin thus influence energy intake and insulin sensitivity.[22] Moreover, WAT also stimulates the secretion of inflammatory mediators especially TNF-α and IL-6 that predispose obese individuals to a pro-inflammatory state.[23] Thus the possible causal for adipose tissue dysfunction may include inflammation and altered secretion of adipokines.[24]

Leptin is a non-glycosylated peptide hormone derived from WAT constitutes a 16-kD protein encoded by ob (lep) gene.[25,26] Functionally, food intake and energy balance in humans is regulated by leptin which mediates its action through neuroendocrine signaling by binding to specific leptin receptors (ObRs) present in the brain predominantly in the hypothalamus.[27] Additionally, leptin has manifold effects on human biology as it has receptors that are expressed ubiquitously on various organs including heart, lungs, kidneys, and pancreas.[28] Its signaling is mediated primarily through activation of Janus kinase 2/signal transducer and activation of transcription 3 (JAK2/STAT3) pathways.[28-31] JAK2 and STAT3 pathways are involved in the transcription of various genes that affect cellular and biochemical processes.[32] Other than a hormone, it has been suggested that leptin as a cytokine could acts as an important link between obesity and non-communicable diseases (NCDs) such as cardiovascular[33,34] and cerebrovascular disease[35]. The underlying mechanism is potentially mediated through its various effects on the vascular inflammatory response, blood pressure[36,37], platelet aggregation[38], and atherosclerosis[39] and is thus considered a pro-atherogenic, pro-inflammatory, and pro-thrombotic adipocytokines.[40,41] In general, leptin enhances the secretion of pro-inflammatory cytokines (IL-6, TNF-α & IL-2), Th1 cells function, and activation of antigen-presenting cells (APCs).[29,42,43] Interestingly, the high levels of pro-inflammatory cytokines have been correlated with increased leptin levels in obese individuals.[44]

Role of Obesity & Leptin in Viral Infections

Throughout the world, obesity arising as a new class of disease contributes as a co-morbid factor in various life-threatening conditions. Obesity association with pathogenic viruses is well -established example of adenovirus infection where obesity is linked in over 10, 000 subjects.[45] Emerging literature on dysregulation of adipocytokines especially leptin is now considered as a significant determinant of the severity of viral infection in obese patients.[46, 47] Additionally, obesity serves as a link between metabolic control and immune tolerance.[48] There are reports in the literature suggest that circulating leptin levels in plasma are significantly regulated by the body mass index and metabolic condition.[49] The main function of plasma leptin is metabolic homeostasis. It acts as a secondary messenger to pass information about body mass to the hypothalamus, which regulates energy balance by insulin metabolism.[50] Simultaneously, leptin also regulates immune modulators and

various pro-inflammatory cytokine-like interleukin (IL)-6, and tumor necrosis factor-α (TNF-α).[51] It has also been investigated that leptin increases susceptibility towards infection both in vitro and in vivo conditions. In a study, obese mice with leptin resistance increase their susceptibility towards influenza infection, the main mechanisms lie with decreased IFN-α, IFN-β, and IFN-γ and suppressed T-cell response and IFN-α, IFN-β, and IFN-γ levels leading to more viral infiltration.[52]

Leptin significantly upregulates the functionality of Th17 immune arm and suppresses the Th2 differentiation, ERK1/2 phosphorylation, and is the most plausible mechanism in respiratory syncytial virus infection.[53] HIV-infected patients have an enhanced leptin receptor expression on peripheral blood mononuclear cells (PBMCs), whereas low leptin levels in circulation are strongly associated with immune response deficiency in these patients.[54,55] Recently, leptin therapy showed a beneficial role in HIV patients.[56] However, published studies have shown the contrary nature of leptin in perspective of its deficiency. A decrease in leptin levels increases the susceptibility of acquiring other infections.[43,51,52] Significantly reduced leptin levels in malnourished individuals are strongly associated with dysregulated immune response and atrophy of the thymus.[57,58] In addition, leptin deficiency is linked with various infectious diseases like viral infection[59,60] and bacterial infections, namely sepsis[61], tuberculosis[62] and leishmaniasis[63] as there is defective cytokine production.[64] Leptin receptor deficiency in mice results in slow viral clearance, and reduced levels of IFNγ levels in the lungs lead to a low survival rate when infected with influenza-A.[65] These all studies imply that the obesity and leptin axis plays an important role in viral-specific immune defense failure, and it needs further investigation for diseases like COVID-19.

Obesity & Leptin in COVID-19

COVID-19 encompasses a wide spectrum of manifestations, and cases experience mild to moderate illness of the upper respiratory tract.[66,67] Acute respiratory distress syndrome (ARDS) was found to be associated with 42% of COVID-19 cases.[68,69] Substantial evidence from the available literature suggests that obesity is a major risk factor for SARS-COV-2 infection to enhance disease progression and mortality.[70,71] A systematic review published by Popkin et al showed that overweight and obesity increase the risk of hospitalization(>46.0%), ICU admission (113%), mortality (74%), and death in COVID-19 cases (48%).[8]

Another study by Stefan et al. reported that 70–90% of ICU admission cases were overweight and, concluded that individuals with obesity are at increased risk of COVID-19[72]. Similar findings were observed in a case study of 12 hospitals in New York that revealed that among 5700 COVID-19 patients, 41.7% of patients were obese, 56.6 % hypertension, and 33.8 % diabetes.[2] The probability to develop ARDS is significantly high among individuals with obesity.[11] Obesity physically compresses the lungs, decreases the residual capacity, and tidal volume resulting in shortening of the inner diameter of the airway that leads to airway resistance.[73] It is proposed that these respiratory physiological changes in obese individuals may worsen respiratory infections and are associated with the severity of COVID-19. Of concern, a systemic review and meta-analysis were conducted to observe the association of obese H1N1 patients and the risk of Intensive care unit (ICU) admission. They reviewed 53 articles and six cross-sectional studies and observed that among 3,059 individuals who were infected with H1N1, 804 (26.2%) were markedly obese with body mass index ≥40 kg/m2, and were more likely to be admitted to ICU compared to non-obese H1N1 patients.[74] Obesity is a low-grade chronic inflammatory state that shows dysregulation of various adipocyte-derived cytokines (Leptin, resistin, adiponectin, visfatin, chemerin, IL-6, &TNF-α).[75,76] Indeed, the high body mass index (BMI) in obese people interactively impairs the immune responses to NCDs and viral diseases.[12,15,77] The multifaceted nature of obesity can profoundly alter the pathogenesis of ARDS which is the utmost cause of death in COVID-19 cases.[12,47] However, the underlying cause is unclear. It is well known that white adipose tissue (WAT) is the major source of cytokines, chemokines, and metabolically active inflammatory mediators.[78] Moreover, macrophages derived from adipose cytokines secret cytokines like TNF-α, IL-1β, and IL-6 affect potential impacts in inflammatory processes.[78,79] Interestingly, the cross-talks between pro-inflammatory cytokines (TNF-a, IL-1β, and IL-6) and adipocytokines such as leptin, adiponectin, visfatin, chemerin probably interconnect obesity and related inflammatory disorders.[79] In lean people, anti-inflammatory cytokines like interleukin (IL)-10, 13, and 4 are produced by Th2, regulatory- T cells and eosinophils, in turn stimulating M2 macrophage activation. Cytokines secreted by M2 macrophages help to regulate insulin sensitivity in slender people. On the other hand, in people with obesity, high amount of Th1 cells, regulatory T cells,

eosinophils, mast cell, cytotoxic T- cells, B- cells and immunoglobulins are found that cause insulin resistance.[80]

Considering the pathogenesis of COVID-19, ACE2 receptors are the target for SARS-CoV-2 expressed abundantly on lungs, heart, blood vessels, and adipocytes facilitate the virus entry and replication.[81,82] Consequently, SARS-CoV-2 infection activates the alveolar macrophages, which further trigger cytokine release and subsequent activation of T-cell and neutrophils.[83] Looking at the immunological triggers, elevated levels of pro-inflammatory cytokines viz. IL-2, IL-10, IL-7, TNFα, MCP-1, and G-CSF were detected in severe cases of COVID-19 patients.[84] Growing evidence shows that these cytokines and growth factors play a crucial role in developing the 'cytokine storming' which reflects the characteristics of the severe form of COVID-19 and develops ARDS that may disrupt multiple cellular processes, cause organ collapse, shock, and eventually death.[85,86] Previously, a study by Ibrahim et al showed that the reduction in ACE2 is allied with increased levels of ATII and Leptin.[87] Moreover, high leptin levels were also found to be associated with decreased alveolar fluid clearance, and an increased inflammatory response to ARDS. [88] Further, the higher leptin levels were also estimated in ventilated patients when compared to the control group and this hyperproduction of leptin increases pulmonary infection in ventilated patients. This cross-sectional study revealed that the mean BMI of SARS-CoV-2 ventilated patients was 31 Kg/m2 with 21.2 mean leptin levels when compared with control patients of SARS-CoV-2 having the mean BMI of 26 Kg/m2 and mean leptin level was 5.6Kg/m2.[10] In a recently published study, coagulopathy had also been reported to be associated with poor prognosis in patients with COVID-19.[89] A resilient link between obesity and thrombosis-promoting molecules such as plasminogen activator inhibitor-1(PAI-1) also has been studied.[89] Notably, leptin increases the PAI-1 in obese subjects were also demonstrated, and it seems leptin plays a crucial part in the pathophysiology of SARS-CoV-2 infection, however, the mechanism is partially explained and needs further studies to ascertain the role of leptin that may increase the susceptibility of acquiring COVID-19 in obese individuals (Figure1).

Obesity & Therapeutic implications

Ample evidence shows that obesity alone and related comorbidities such as hypertension, type 2 diabetes, CVD and renal diseases deteriorate the conditions of COVID-19 patients and have been associated with the worst outcomes in these patients.[90-93] This insight suggests the inflammatory cytokines secreted by adipose tissue including leptin could act as the target molecule(s) for effective treatment in COVID-19, especially in a hyper-inflammatory response. In obesity, excessive adipose tissue releases high leptin levels since this can be postulated that dysregulated leptin levels could worsen the illnesses and slow down the prognosis of COVID-19 and finally lead to severe respiratory condition.[10,17] Wang et al explored the underlying pathway through

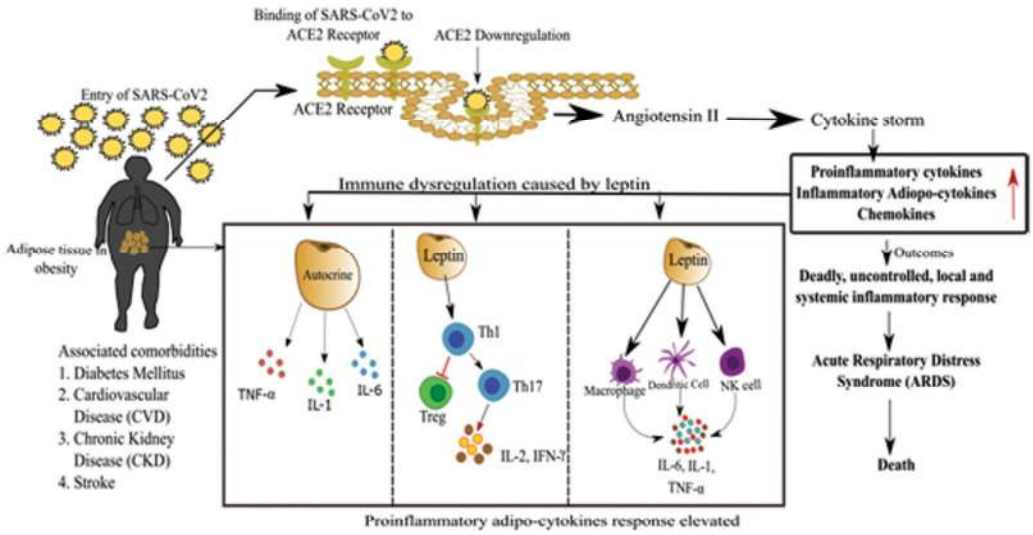

Fig. 1: Depicts the possible mechanism through obesity and associated comorbidities lead to fatal outcomes in COVID-19 patients.

which leptin is involved in cytokine storming using a large cytokine array study mainly containing inflammatory cytokines in COVID 19 patients.[17] Leptin was found the most commonly up-regulated cytokine along with IL-6, IL-10, IL-12, CXCL-10 and TNF-α. Moreover, leptin was consistently associated with disease progression in COVID19 in overweight patients.[17] Furthermore, the expression of ACE2 expression is not limited to lung tissue and is expressed in adipose tissue at higher levels than that in lung and other tissue.[94,95] Therefore, this makes obese people vulnerable to SARS-CoV-2 by increasing the number of ACE2-targeting sites that allow viruses to enter cells and appear to act as a reservoir of SARS-CoV-2.[96] Based on these observations, this could be postulated that pharmacological perspectives targeting the increased leptin production might be considered a possible treatment of COVID-19. Additionally, merely controlling diet or bodyweight may also mitigate the inflammation of COVID-19 patient.[97] Despite this, large research efforts are inevitable to decipher the impact of obesity and high BMI on the disease progression and mortality of COVID-19 patients. Vaccination against the Sars-Cov2 virus is a safe and effective method to mitigate the risk of infection through the production of antibodies and long-lasting immunity. The influence of overweight and obesity on the efficacy of various vaccines is not well addressed due to the scarcity of data. Previously, poor humoral response to hepatitis B vaccination was reported in obese individuals.[98] Also, children with high BMI showed a considerably lower antibody response to tetanus vaccine compared with lean healthy children.[99] Similarly, the diminishing response of hepatitis A and rabies vaccines has also been observed in people with obesity.[100] Humoral immune response in people with obesity is also found to be low. In a study on H1N1 virus, the viral load and viral incubation time in population with high fatty adipose tissue is more compared to individual with lean adipose tissue. The vaccine efficacy was also found to be low in participants with obesity.[101]

In the context of COVID-19 vaccination, some evidence suggests that patients with high BMIs perhaps suffer from intensified SARS-CoV-2 infection may not respond to a vaccine to the same extent as individuals with normal BMI.[96, 102,103] In a recent study, obese people have shown the widest range in antibody titer after the second dose. Moreover, the efficient antibody response was reported in normal weight and lean individuals in comparison to participants with obesity ($p < 0.0001$).[104] Notably, obesity modifies the immune response by impairing humoral and cell-mediated branches of the immune system, thus researchers have hypothesized that the efficacy of the COVID-19 vaccine may disproportionately vary among obese people.[96,105] It is pertinent to mention that long term follow-up of double-blind placebo-controlled trials is required to determine the long-term effectiveness of vaccine immunogenicity, particularly in high-risk groups.

Conclusion

COVID-19 has impacted the healthcare system in particular and global economies as a whole. Several risk factors have been identified and studied in detail so far. Among those, obesity seems to be one of the most important. The prevalence of obesity is increasing globally, not only in higher-income countries but also in lower and middle-income countries. Accumulating data suggests that obesity provides a gateway to the virus for the initiation, development, and outcomes of COVID-19. Therefore, it is essential to know anthropometric records for patients with COVID-19, and appropriate lifestyle interventions are needed to ameliorate modifiable risk factors on a global scale that could be effective to increase resistance to SARS-CoV-2 infection. Large long term clinical studies will give deeper insights into the subject. Moreover, understanding the mechanism of dysregulation of leptin can help in adopting better and more effective therapeutic interventions, including vaccination in patients against the severe SARS-CoV-2.

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Review Article

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Diptheria and Overview

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Abstract

Diphtheriae is an acute disease caused by exotoxin- producing Corynebacterium. Globallydiphtheria is showing a declining trend due to Childhood Vaccination to door to door in villages and urban areas. Our India is contributed majorly in it and global burden of diphtheria is from India. Diphtheria is a potentially fatal infection mostly caused by toxigenic Corynebacterium diphtheriae strains and occasionally by toxigenic C. ulcerans and C. pseudotuberculosis strains.

Keywords: Exotoxin, Declining, Vaccination.

Introduction

The diphtheria bacillus was discovered and identified by German Bacteriologists Edwin Klebs and Friedrich Loffler and this disease get it official name in 1826 by French physician Pierre Bretonneau.This is because it refers to the leathery, sheath -like membrane that grows on tonsils, throat and in the nose. There are two types of diphtheria: Respiratory and cutaneous. Respiratory causes nose, throatproblem,tonsils andcutaneous causes problem in skin. So, basically diphtheria is upper tract respiratory disease.

- In the past its name (general disease, killerdisease) because no treatment is present in past and it led to high mortality between the children. It was said that disease killed 80% of the children below 10 years.

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- Diptheria is acute bacterial infection caused by Corynebacterium diphtheriae.
- Diptheria is endemic in India.
- Common below 15 years of age.
- Mostly in winter and autumn seasons.
- Both sexes are equally affected.

Etiology

Causative agent-Corynebacteriumdiphtheriae.
Cultural and biological species:

- Gravis
- intermedius
- mitis

Exotoxin protein with antigenic properties. Two fragments: A-thermostable, biosynthesis inhibition B - thermolabile, adhesion.

Clinical Manifestations

- Incubation period 2 to 5 days.
- Gradualonset, moderateintoxication.
- Moderate pharyngeal pain.
- White pseudo membranes (greyish)
- Local Edema.
- Paresis of soft palate.

- Affection of myocardium

Sign and symptoms are -

- Fever
- chills
- bluish skin coloration (cyanosis)
- Sore throat @ Hoarseness
- Cough
- Headache Difficulty in swallowing
- Difficulty in breathing
- Foul - smelling
- Bloodstained nasal discharge and lymphadenopathy.

Diagnosis Evalution

- Sample collection: Throat swab or swab from membrane.
- Microscopy: Gram Stain and albertsstain.
- Culture: Loefflers and PT
- Biochemicals and virulence test in vivo and vitro.

Treatment

Antibiotics

- prevention of further toxin production.
- control local infection
- Reduction of transmission.

Penicillin (1200 mg 6 - hourly i.v.) oramoxicillin (500 mg 8 - hourly) should be administered for 2 weeks to eliminate C.diphtheria.

Erythromycin orally or by injection (40- 50 mg/ kg/day; maximum, 2gm /day) for 14 days.

Nursing Intervention

- Improve thermoregulation.
- Maintain room temperature.
- Advise client to wear thin clothes that absorb sweet easily.
- Encourage to increase oral fluid intake.
- Administer antipyretics as ordered by the physician.
- Improve caloric intake.

Conclusion

Diphtheriae is an acute disease that shouldn't be ,is preventable with immunization. It exists and causes outbreaks wherethere are inadequate public health systems because of poverty, war, displacement of population, natural disasters or neglect

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