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PREFACE TO THE 1st ISSUE OF 10th VOLUME OF NATIONAL JOURNAL OF MEDICAL AND ALLIED SCIENCES 2021

Prof. (Dr.) Syed Esam Mahmood

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The National Journal of Medical and Allied Sciences a **peer reviewed** and **open access** journal is now in its **10th year**. I am delighted to report to our readers that the **Index Copernicus Value** (ICV) for 2019 has been released. The ICV is **71.79**. The Cosmos **Impact factor** for 2018 was **4.465**. In this issue, we are publishing two review articles and five original research articles.

In the first article, a critical review by **Alshahrani** et al examined the effectiveness of various interventions and the quality of the existing evidence published on the benefits of age-based licensing. Overall, the general consensus in the empirical body of research on age-based licensing suggested that the underlying reason for the limited effectiveness of this strategy lies in the continued reliance on unsystematic screening methods. Despite the continued reliance on evidence-based approach as part of the decision-making process, policymakers in New South Wales seem to neglect the wider factors affecting age-related unsafe behaviour on the roads. Interventions from public health practitioners in the form of developing clinical criteria based on disabilities, implementing a more effective assessment system and promoting training opportunities for older drivers are thereby urgently needed.

In the second review article, **Mukherjee** made an attempt to explain the physiological basis of parenting behaviour in animal kingdom as a whole. It was concluded that, the great variety of parental caregiving systems displayed by animals should be thoroughly explored and most importantly, cross-talk between animal and human subjects research should be promoted.

In the third article, **Saxena** et al observed the efficacy of early resuscitation and recurrent monitoring to reduce morbidity and mortality in patients of traumatic shock. Out of total 50 patients, 64% cases were treated by conservative treatment and 36% cases were treated by surgical treatment. The overall mortality was 26%. Resuscitation and intensive monitoring played an important role for better survival.

In the fourth article, **Prasath** et al assessed the safety of Paclitaxel Carboplatin chemotherapy regimen in patients with Cancer Ovary and to observe the toxicities. Surface epithelial cancer of Ovary mainly affects the middle aged women. The commonest histopathology was serous carcinoma and most of the patients presented in an advanced stage of the disease. The most important non haematological toxicity was

peripheral sensory and motor neuropathy. Neutropenia was the major haematological toxicity followed by Anemia and Thrombocytopenia. Chemotherapy was well tolerated by most of the patients. Neutropenia was the most important toxicity which resulted in postponement of chemotherapy. This may even have affected the result of the chemotherapy treatment.

In the fifth article, **Dutta** et al observed a total of 100 third trimester pregnant females of uncomplicated pregnancy divided into two groups (Group A and Group B, each having 50 subjects). Their percent predicted values of FVC, FEV_1 and FEV_1/FVC ratio were compared with control (Group C-50 subjects) using Helios-401 spirometer. Both of the Groups A and B (pregnant subject group) had significant less values of FVC, FEV_1 and FEV_1/FVC ratio in comparison to Group C (non-pregnant group). This study validates the physiological changes, adaptations and decline in pulmonary function in pregnancy especially in the last trimester. The effect of mechanical factors like the enlarged uterus displacing the diaphragm upwards as well as hormonal influences also may play a role, in altering and compromising the pulmonary flow parameters. Continuous monitoring of pulmonary function tests during routine antenatal care may prove to be of great value in maternal healthcare as cases of restriction and obstruction in lungs during pregnancy can be identified early and its deterioration can be prevented by proper management.

In the sixth article, **Thokar** et al evaluated the serological profile of Toxoplasma gondii IgG antibodies in female patients having bad obstetric history. Out of total 85 patients, 16 (18.8%) cases were seropositive for toxoplasma IgG antibodies whereas 69 (81.2%) cases tested negative. This study contributes to the fact that toxoplasma infection plays a pivotal role in unpropitious foetal outcome. The socio-epidemiological aspects also played an important contributing role in the spread of the disease.

I would like to thank all the reviewers, authors and my team members for their excellent work and constant support.

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CRITICAL EVALUATION OF NEW SOUTH WALES (NSW) REFORMS IN INTRODUCED AGE-BASED DRIVER LICENSING

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ABSTRACT

Driving is the primary mode of transport for many older people and enables participation in daily activities, employment and social interaction. Concerns have been raised due to increased crash involvement and vulnerability to crash injury. Though age-based licensing has been in place in New South Wales (NSW) for decades, in July 2007, reforms to licensing of older drivers were proposed. This critical review aims to examine the effectiveness of various interventions and the quality of the existing evidence published to date on the benefits of age-based licensing.

Key words: Driving, injury, licensing, New South Wales, Australia, age

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INTRODUCTION

Several regulatory measures, including speed limits, compulsory seat belts and driving restrictions, have been introduced across the globe in order to prevent unsafe behaviour on the roads and by doing so, limit the number of accidents and fatalities. Introduced in 2007 and reviewed in 2012, the policymakers in New South Wales (NSW) extended the existing measures by adding age restrictions part of the age-based licensing strategy [1]. While the policymakers continue to defend their position arguing that it represents a part of a systematic effort for minimising unsafe behaviour on the roads [1], wider stakeholder concerns about mobility and age-discrimination have emerged [2]. Although the review of the age-based licensing in NSW supported the underlying rationale [2], the growing body of empirical research has so far failed to uncover any significant positive impacts of these regulatory measures [3, 4, 5].

The aim of this review is tied to age-based licensing introduced in NSW. Following a critical review of the existing evidence on the benefits of age-based licensing, the effectiveness of age-based licensing is questioned. The final sections discuss factors influencing the decision-making process and strategies that public health practitioners can use to influence policy development.

Evaluation of NSW age-based licensing

The growing discussion in policymaking circles about the need for age-based licensing can be traced to the wider demographics and social trends [6]. The number of individuals aged over 65 years is increasing due to the ageing population phenomenon [7]. Moreover, active car use has become a key criterion for mobility [8], particularly in the context of rural areas of Australia. Concerns about driving competence of older individuals combined with the increased proportion of older

drivers have thereby led to policy discussions about age-based restrictions. Reliance on voluntary self-assessments of older drivers has been proven naïve as cognitive decline did not result in any decrease in self-evaluation of driving abilities [9]. The notion of self-enhancement bias is well-recognised in the ongoing policy debate, impeding the reliability of any self-restriction strategies to promote road safety [10]. Studies in support of the argument for the introduction of age-based licensing have established a premise that older drivers are more easily distracted, committing more safety errors in comparison to younger generations [11].

From a methodological perspective, the validity of the supporting evidence in favour of age-based driving restrictions can be questioned due to the low mileage bias [7]. On average, individuals over 70 years old tend to drive approximately 60 miles in local areas per week [12]. Older individuals tend to drive mainly in urban areas that can be characterised by a higher complexity of traffic patterns, making them more prone to accidents. Consequently, the commonly used per-population or per-driver crash rates are insufficient to provide a realistic comparison due to the underlying differences in driving activity [3]. Similarly, the statistical finding of a higher involvement of older drivers in fatal accidents has been explained by fragility, rather than significantly less safe behaviour on the road [13, 14].

Stakeholders' perspectives have been explored by Adler and Rottunda [15], suggesting that while the population generally supported driving restrictions for over 90-year old drivers and patients with a Parkinson's disease, the level of endorsement for such measures in the age group of 70-year old individuals was very low. A comprehensive evaluation carried out by Siren and Haustein [4] revealed that negative effects of age-based driving restrictions in terms of reduced mobility outweigh any presumed positive gains in terms of safety on roads. Studies conducted in different settings, including Australia [3], European Union [4] and the United States [5], have equally concluded that age-based driving interventions do not have any significant positive impacts on driving safety. Siren and Haustein [4] went even further, considering such measures to be coercive rather than evidence-based.

The requirement for age-based testing has been associated with a significant decline in the number of individuals within the target population that wish to renew their driving licenses [6]. On a comparative basis, this requirement results in individuals being 1.52 – 2.22 less likely to continue driving, suggesting that age-based driving licensing is effective in discouraging older drivers. The proposition that this decline leads to a safer behaviour on the road is however largely misplaced due to two inherent issues. On the one hand, the population at risk (adults over 65 years old) is very broadly defined. Empirical body of research has consistently reported that sensory impairments are better predictors of motor vehicle collision risk than age alone [16]. The outcomes of the study conducted by Ross et al. [6] however that the proportion of drivers with cognitive and visual impairments remain unaffected by the age-based licensing restrictions. Hence, the first issue revolves around the broadly defined focus of these interventions which fail to target the specific group at risk for accidents [17].

On the other hand, the second issue revolves around the shortcomings in the testing process as part of the age-based licensing. General practitioners who are asked to assess the physical and mental abilities of older individuals to drive have been shown to have limited awareness of the regulations and would rather see another medical body to oversee this form of assessments [18]. Novel testing methods (e.g. SIMARD-MD) have been questioned due to limitations in precision of the assessment of fitness-to-drive [19]. One of the promising avenues in this stream of research can be found in the notion of hazard perception test that has been shown to predict motor vehicle accident risk [20]. This measure has already been implemented in Queensland as part of the mandatory driving test. Positive contributions to hazard perception training have been shown by Horswillet al [21]. In line with the increasing ease of distraction among older individuals, Aksanet al. [22] recommended the use of tests assessing navigation performance.

An alternative approach has been proposed by Lucidiet al. [23], providing validation for theoretical models of risky driving among young drivers in the context of the older population. According to the

authors, personality traits represent the key predictors of traffic violations and errors, highlighting the need for a more targeted screening method and development of positive attitudes towards safety on roads. Moreover, the role of advanced vehicle technologies has also been shown to address the age-based changes in driving behaviour of older individuals [24].

Effectiveness of NSW age-based licensing

Consistent with the systematic evaluations of the age-based licensing restrictions [3, 4, 5], the effectiveness of NSW regulatory measures can be expected to be very low. Drawing on the outcomes of the critical evaluation within the previous section, three particular challenges impeding the effectiveness of NSW age-based licensing can be pointed out.

First, the scope of the intervention is very broadly defined. Older drivers have been identified by policymakers as the specific group within the population that is more prone to motor vehicle accidents. Out of 370 deaths caused by road accidents last year, 64 were in the age group of over 70 years [2]. This rationalisation however neglects the low mileage bias and driving patterns which increase the motor vehicle accident risk [7]. Empirical findings reveal that age-based restrictions are largely ineffective in limiting the proportion of drivers with cognitive and visual impairments, a group that is more prone to accidents on the roads [6].

Secondly, screening techniques used as part of the age-based licensing are inadequate to effectively assess fitness-to-drive [19]. The proven validity of hazard perception test [20] and assessment of navigation performance [22] yet remain to be effectively utilised in NSW as part of the age-based licensing restrictions.

Thirdly, additional factor reinforcing the ineffectiveness of age-based licensing in NSW can be found in the relatively low support for the intervention from the stakeholders [15]. These concerns not only question the policy but also impede the level of implementation. A practical example can be made of general practitioners who are largely unaware of the regulatory measures and often do not fulfil their role in the assessment process as devised by the policymakers [18]. The general lack of stakeholder support stems from the mobility concerns which seem to outweigh any potential gains in terms of improved road safety [4].

Decision-making process

The ongoing policy debate on the topic of age-based licensing in NSW seeks to promote an evidence-based approach to the decision-making process [2]. As a result, the Safety Committee established as part of the government initiative to promote safety on roads has carried out a thorough analysis of the patterns in motor vehicle accidents. This level of analysis has identified the older population as the key group prone to accidents, accounting for 64 out of 370 deaths in the last year. Given the higher number of traffic errors in this group of the population, a relationship between declining driving abilities and a higher risk of motor vehicle accidents has been formulated, resulting in the age-based licensing restrictions [2]. The underlying factors shaping the policy discussion can be found in the negative impacts of road accidents on the citizens as well as the national healthcare system.

However, while the decision-making process is perceived by the government in NSW as evidence-based, Siren and Haustein [4] considered these practices to be largely coercive rather than evidence-based. A considerable number of various biases can be associated with the decision-making process in question, particularly relating to the presumed effectiveness of the screening process and the generalisation resulting in the identification of individuals over 75 years old as the group most prone to motor vehicle accidents. The inherent factors shaping the dynamics of the studied phenomenon, including cognitive and visual impairments have been however largely neglected or merely attributed to the age.

Public health practitioners' interventions

One of the principal features of an effective evidence-based approach to decision-making and policy formulation should be a continuous evaluation of the intervention and its impacts [4]. In this context, public health practitioners need to continuously monitor and re-assess the presumed relationship between age and driving safety. Since

the policy intervention itself has been largely developed on the basis of a statistical relationship between older age and proneness to motor vehicle accidents, this relationship should also provide the basis for assessing the impacts of the age-based licensing. Particular attention however needs to be placed on better formulating the studied parameters and acknowledging the inherent biases influencing the validity of the statistical analysis (e.g. low mileage bias).

An additional area in which public health practitioners can aid in the ongoing process for promoting road safety lies in the development of effective screening methods and training techniques for limiting unsafe behaviour.

The main strategy for public health practitioners to voice their concerns about the validity of the age-based licensing restrictions in NSW is through direct queries and validated research studies. Comparative assessments between individual regions of Australia and highlighting the existence of cognitive biases neglected in the formulation of the age-based licensing restrictions could provide the basis for re-assessing the benefits derived from this policy. Furthermore, public health practitioners should also emphasise the negative attributes of this policy, mainly in the form of reducing mobility, seeking to establish a cost-benefit analysis for the age-based restrictions on driving [4].

CONCLUSION

Overall, the general consensus in the empirical body of research on age-based licensing suggests that the underlying reason for the limited effectiveness of this strategy lies in the continued reliance on unsystematic screening methods. From an equity perspective, the effects of various disabilities rather than age should be prioritised in the development of licensing policy, yielding a more effective solution for preventing unsafe behaviour. Despite the continued reliance on evidence-based approach as part of the decision-making process, policymakers in NSW seem to neglect the wider factors affecting age-related unsafe behaviour on the roads. Interventions from public health practitioners in the form of developing clinical criteria based on disabilities, implementing a more effective assessment system and promoting training opportunities for older drivers are thereby urgently needed.

References

[1] Guide to older driver licensing. Roads and Maritime Services New South Wales. Retrieved from:http://www.rms.nsw.gov.au/roads/licence/older-drivers/index.html [accessed 06/10/2017]

[2] Harris L. Elderly motorists face tough test to keep their licence to drive. The Telegraph. Retrieved from: http://www.dailytelegraph.com.au/news/nsw/nsw-parliamentary-committee-considering-an-overhaul-of-laws-and-whether-elderly-are-fit-to-stay-on-our-roads/newsstory/ebda4e5a7e332fa84c7d9f2e8dc1af53 [accessed 06/10/2017]

[3] Langford J, Fitzharris M, Koppel S & Newstead S. Effectiveness of mandatory license testing for older drivers in reducing crash risk among urban older Australian drivers. Traffic Injury Prevention 2004; 5(4): 326-335.

[4] Siren A & Haustein S. Driving licences and medical screening in old age: Review of literature and European licensing policies. Journal of Transport & Health 2015; 2(1): 68-78.

[5] Stav WB. Updated systematic review on older adult community mobility and driver licensing policies. American Journal of Occupational Therapy 2014; 68: 681-689.

[6] Ross LA, Browning C, Luszcz MA, Mitchell P, Anstey KJ. Age-based testing for driver's license renewal: potential implications for older Australians. J Am Geriatr Soc. 2011;59(2):281-285.

[7] Desapriya E, Harjee R, Brubacher J, Chan H, Hewapathirane DS, Subzwari S et al. Vision screening of older drivers for preventing road traffic injuries and fatalities. *Cochrane Database Syst Rev*. 2014;(2):CD006252. Published 2014 Feb 21. doi:10.1002/14651858.CD006252.pub4

[8] Siren A & Haustein S. Driving cessation anno 2010: Which older drivers give up their license and why? Evidence from Denmark. J*ournal of Applied Gerontology 2016*; *35*(1):18–38.

[9] Shimada H, Tsutsumimoto K, Lee S, Doi T,

Makizako H, Lee S et al. Driving continuity in cognitively impaired older drivers. Geriatrics & Gerontology International 2016; 16(4):508-514.
[10] Horswill MS, Sullivan K, Lurie-Beck JK & Smith S. How realistic are older drivers' ratings of their driving ability? Accident Analysis & Prevention 2013; 50:130-137
[11] Aksan N, Dawson JD, Emerson JL, Yu L, Uc EY, Anderson SW & Rizzo M. Naturalistic distraction and driving safety in older drivers. Human Factors 2013; *55*(4) :841–853.
[12] Coxon K, Chevalier A, Lo S, Ivers R, Brown J & Keay L. Behind the wheel: Predictors of driving exposure in older drivers. Journal of the American Geriatrics Society 2015; 63(6): 1137-1145.
[13] Cichino JB & McCartt AT. Trends in older driver crash involvement rates and survivability in the United States: An update. Accident Analysis & Prevention 2014; 72: 44-54.
[14] Cichino JB. Why have fatality rates among older drivers declined? The relative contributions of changes in survivability and crash involvement. Accident Analysis & Prevention 2015; 83: 67-73.
[15] Adler G & Rottunda SJ. Mandatory testing of drivers on the basis of age and degenerative diseases: Stakeholder opinions. Journal of Aging & Social Policy 2010; 22(3): 304-319.
[16] Green KA, McGwin G & Owsley C. Associations between visual, hearing, and dual sensory impairments and history of motor vehicle collision involvement of older drivers. Journal of the American Geriatrics Society 2013; 61(2): 252-257.
[17] MacLeod KE, Satariano WA & Ragland DR. The impact of health problems on driving status among older adults. Journal of Transport & Health 2014; 1(2): 86-94.
[18] Lipski PS. A survey of general practitioners' attitudes to older drivers on the New South Wales Central coast. Australasian Journal of Ageing 2002; 21(2):98-100.
[19] Bedard M, Marshall S, Man-Son-Hing M, Weaver B, Gelinas, I, Korner-Bitensky et al. It is premature ot test older drivers with the SIMARD-MD. Accident Analysis & Prevention 2013; 61: 317-321.
[20] Horswill MS, Hill A & Wetton M. Can a video-based hazard perception test used for driver licensing predict crash involvement? Accident Analysis & Prevention 2015; 82: 213-219.
[21] Horswill MS, Falconer EK, Pachana NA, Wetton M & Hill A. The longer-term effects of a brief hazard perception training intervention in older drivers. Psychology and Aging 2015; 30(1): 62-67.
[22] Aksan N, Anderson SW, Dawson J, Uc E & Rizzo M. Cognitive functioning differentially predicts different dimensions of older drivers' on-road safety. Accident Analysis & Prevention 2015; 75: 236-244.
[23] Lucidi F, Mallia L, Lazuras L &Violani C. Personality and attitudes as predictors of risky driving among older drivers. Accident Analysis & Prevention 2014; 72: 318-324.
[24] Gish J, Vrkljan B, Grenier A & Van Miltenburg B. Driving with advanced vehicle technology: A qualitative investigation of older drivers' perceptions and motivations for use. Accident Analysis & Prevention 2017; 106: 498-504.

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PARENTING HABITS IN BIRDS AND IT'S PHYSIOLOGICAL BASIS

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ABSTRACT

Parental care of offspring needs a huge investment either by father or mother or both. Most common type of care in animal kingdom is single parent care. Even in mammals, only 3-5% invest in bi-parental care . In contrary, bi-parental care is the most common form of rearing offspring in birds as seen in about 85% species . The 'good parent hypothesis' states that birds can invest more energy towards their own survival rate by choosing an ideal mate thus investing more towards a bi-parental care and rearing stronger offspring than those cared by single parent. Female birds are generally more likely to care for the offspring of males that spend more time building nest and build more elaborate nests. As a consequence, the reproductive success of males tends to increase with nest size and building behaviour . This article tries to sum up the important views proposed by various researchers over last thirty years time and explain it in the light of recent advances in physiology.

Keywords: Birds, parental care, physiology

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INTRODUCTION

All 9000 species of birds lay eggs and they vary in size from the tiny 0.2 gram eggs of humming birds to the 9 kg eggs of the extinct elephant bird. Mother bird dispenses the fertile eggs as soon as the shell is formed to retain mobility. These apparently fragile looking eggs are actually engineering marvels - the surface resembles an arched bridge and for the same reason it can withstand an incubating mom's weight. It takes 26 pounds of pressure to break a swan's egg and 120 pounds to smash the egg of an ostrich. These protein-rich eggs are a prize to the predators. So the birds have developed innumerable ways of building nests for safe hatching and a male bird's suitability as a pair depends on it's skill in building nests [1-5].

It is presumed that the earliest form of parental care was mono-parental male care [6,7,8]; the next stage of evolution replaced this with bi-parental care with a few exceptions.

Ligon and Vehrencamp suggested that male incubation existed first and later gave way to shared and finally female only incubation [9,10].

Between 1975 to early 2005 Andrew Cockburn thoroughly compiled articles about parenting behaviour in almost all the species of birds. He estimated the prevalence of six distinct modes of care: use of geothermal heat to incubate eggs, brood parasitism, male only care, female only care, bi-parental care and cooperative breeding [2].

MATERIAL AND METHODS

An attempt was made to explain the physiological basis of parenting behaviour in animal kingdom as a whole. Search strategy comprised of using relevant search terms from databases and internet sources like Google Scholar, DOAJ, Pubmed, etc.. Ethical approval was not required as it was a secondary study.

RESULTS

In the following section various modes of care will be discussed and an attempt will be made to explain the physiological basis of parenting behaviour in animal kingdom as a whole.

Methods of providing care in birds:

Female only care and cooperative breeding are known to occur in 8 and 9 of the bird species respectively. Bi-parental care by a bonded male and female is the most common pattern of care seen in 75−81% of the species. 1% of the species escape parental care through brood parasitism or the use of geothermal heat and another 1% of all species have male only care. Two of the most widely cited statistics concerning sociability and parental care in birds are the estimates by Lack [11] that 92% of them form pair bonds and Brown [12] reports that 2.5% of all birds breed cooperatively. Lack explicitly emphasized that pair bonds and biparental care are not synonymous.

Parental care is dynamic and either male or female can abandon care to the other at various stages of the nesting cycle. The transitions in many families are associated with it being either *frugivory* (fruit eating) or *nectarivory* (nectar eating). In tropics, availability of fruits may be patchy and short term; hence the males guard the fruiting or flowering trees and the females traverse to gather those fruits or nectar leading to 'female only care'. This is known as the "Hotspot hypothesis" which was proposed by Bradbury [13]. The "Constrained female hypothesis" posits that females would rather prefer low quality but abundantly available local food to feed the chicks and hence they ignore the male help and choose freely among males for good genes [14,15] . In insectivorous species, males are of premium help in obtaining good insects. But if the chicks grow slowly and have low metabolism, females become the sole care giver. In marshlands rich with abundant insects, females alone or in groups can take care of the young ones. In these two cases females prefer good genes rather than parenting skill and huge aggregations of many females at one spot can lead to polygyny and evolution of new species [16]. Another reason for avoiding male help might be due to the fact that presence of male bird near the nest attracts predators especially in rain forests. Cooperative breeding is mostly seen in those species who forage at sea for food but breed on the land. Necessity of prolonged departures to forage enforces constant nest attendance sometimes by the additional birds. In Adelie penguins, non-breeders or even failed breeders improve survival of chicks by huddling, herding into shelter and by defending chicks against skuas (predatory seabirds). Additional attendants also have been seen in many species of tern. Brown skuas are true cooperative breeders; males live the early part of their lives in clubs in the low quality centres of the islands where breeding occurs. Eventually, they form coalitions to drive off territory owners. Although there is a single chick, mating is egalitarian and all coalition males probably contribute to paternity over many years. Cooperation is well known to be more common among residents than migrants. A very large proportion (13%) of all passerines (sparrow, song-bird or finches) are cooperative breeders. A very unusual cooperation in breeding has evolved between the small red-breasted geese of Siberian tundra and the pegerine falcons. Falcons are fierce bird of prey but they don't prey on geese. So these geese nest in tight knots around the falcon's nests. Arctic foxes don't dare to go close to fierce falcons and thus the goose chicks stay safe. On the other hand loud alarm calls of the geese alert the falcons to protect their own chicks [5].

Brood parasitism is the most cunning method of bypassing nest building and parenthood. Cuckoos are the most common example and they parasitize the nests of a large variety of bird species and carefully mimic the colour and pattern of their own eggs to match that of their hosts. Each female cuckoo specializes in one particular host species. It remains profoundly mysterious as to how the cuckoo manages to lay eggs designed to accurately imitate the host's eggs [5].

Polyandry care occurs in roughly 9% of bird species (approximately 852 species) [2]. The two forms of polyandry are sequential and simultaneous polyandry. In sequential polyandry, females will first mate with one male and raise the offspring for a short period of time. Then they will mate with another male and care for that clutch resulting in more genetic diversity and quantity of the offspring per season. Females never incubate offspring alone

unless the male has been killed. Some examples of birds who practice sequential polyandry include spotted sandpipers and red-necked phalaropes. Temminck's stint, little stint, mountain plover, and sanderling are very similar because the females lay a clutch of eggs and the males incubate them. A second clutch is laid that the female incubates herself.

Care needed by the chicks vary widely across the species. Some chicks need constant passive feeding for 5−15 days while a chick of ancient murrelet (small seabird) is taken to the sea almost as soon as it is born. But the most self-sufficient bird on earth is the cuckoo-duck chick of Argentina which spreads it's wings just one day after it's mom drops the egg in the nest of an unsuspecting brown hooded gull. Chicks of hens and ducks grow within the egg and hatch out with fully formed eyes and feathers and can move freely. The chicks of the American white pelican tell their parents when they are too hot or too cold by giving loud and clear distress calls from inside the eggs and the parents adjust their position accordingly [5]. A new research by a team from the department of Zoology, University of Cambridge has found that mother bids communicate with their developing chicks before they even hatch, by changing conditions in the egg. Canary mothers leave a message for their chicks about the life they will face after birth; in response, nestling adjust their begging behaviour! If chicks get a message that they will be reared by generous parents then they beg more vigorously for food after hatching. But chicks that are destined to be raised by meaner parents end up being much less demanding.

By attending to messages in the egg, nestlings gain weight more rapidly because they match their demands to the parents' supply of food, and can avoid either begging too little or wasting effort on unrewarded begging [17].

Factors affecting parental care:

i) *Male-Female ratio :* With an increase in available mates in some birds (e.g rock sparrow) female desertion rate increases leading to more mono-parental care. When female rock sparrows were exposed to an abundant amount of male mates, approximately 50% of the females deserted their first nest when the hatchlings were on average 14.3 days old. The fathers successfully took over all parental duties [3].

ii) *Effect of food on gender ratio:* A study on Zebra finches showed that sex of an egg depended on the amount of nutrients available to the female, not on the male's sperm! Female offspring need more nourishment than males to survive because egg production is metabolically exhaustive and nourishment draining process. Those zebra finches who were fed a lower quality diet, laid eggs that were lighter and less nutrient-rich which produced sons and those fed a higher quality diet produced bigger and more nutrient-rich eggs which produced daughters.

In black-backed gull (Larus fuscus) females which were adequately fed and had higher body condition produced eggs with a lower level of androgens (such as testosterone) [18]. This suggests that females with a lower body condition (which correlates with poor conditions) presumably increase chick quality or chick survival by depositing larger quantities of androgen in their eggs. Thus the birds increase the survivability rate of their species by increasing yolk steroids to fight hostile conditions which can be seen as 'pre-birth parental care' adaptation [19].

iii) *Timing & Temperature of reproduction:* Most birds reproduce earlier if spring comes earlier. Visser [20] undertook a 6-year-long experiment in Great Tits (Parus major) and found that if spring came 3 weeks early birds reproduced early due to earlier development of breeding plumage and other cues. He observed this both in wild and captive birds. Higher early spring temperature also led to higher levels of parental care stemming from more commitment. Because parents find mates to reproduce earlier, it can also be seen as a 'pre-birth parental care adaptation' due to less desertion [3].

iv) *Role of maternal antibody:* Yolk in the eggs of birds contain a maternal antibody IgY which gives protection to the growing chicks against disease. The carotenoids in egg yolk are infused with Vitamin E and anti-oxidants which prevent destruction of IgY and also foetal tissues; this also can be seen as a form of 'pre-birth parental care' [21].

v) *Ornamental cues and parental care:* There is a positive correlation between ornamental cues and parental care as seen in Iberian rock sparrows

(Vincenta garcia navas). Males show greater effort and visit their offsprings more frequently if their females have a larger yellow chest patches [3].

But this good parent hypothesis is challenged in other species; in common yellowthroats of USA, no positive correlation was seen in males having black face mask or yellow ventral patch as they didn't put much investment towards their young ones and their females were also not affected by these ornamental cues. C. R. Freeman-Gallant of the department of biology at Skidmore college, NY, USA concluded that, larger ornamental cues on males rather led them to more male-male competition to find mates for future reproductive success or holding territories. In Pied flycatchers, younger males with large badge size get hold of territory by competing with other males and provide less parental care while females adjust their parental investment to accommodate the male [22].

Discussion on the physiological basis of parenting habits:

In most of the birds species, parents invest profoundly in their offspring as a mutual effort, making a majority of them socially monogamous for the duration of the breeding season. But DNA fingerprinting has revealed that as many as a fifth of the eggs produced by female birds, believed to be monogamous, had not been sired by their regular partners. Also there is evidence for jealousy between competing females for a particular male and even divorce among mates who fail to rear offsprings! The superb fairy wren of Southern Australia is the most promiscuous bird in the world. Both males and females have multiple partners and scientists have concluded that these "extra-marital" liasons among superb fairy wren are largely motivated by wanting to increase their chances at successful breeding [5].

A variety of social, environmental, physiological, and experiential factors influence parental behaviour, but the most important hormonal factor is elevated prolactin (PRL) which is often reinforced by previous elevation of the sex steroids. Prolactin secretion and parental behaviour appear to be mutually reinforcing as contact with eggs or chicks often elevates PRL. Elevated testosterone and paternal behaviour are generally mutually exclusive. Environmental stress, which elevates corticosterone and decreases PRL, can decrease parental behaviour while elevating survival behaviours in adults [23]. Progesterone can also interact with testosterone in modulating male behaviour. A study in 'challenged' (male-male competition) male rufus horneros (oven bird) showed that their progesterone level was high during mating period and testosterone was low during parental care though the ratio of progesterone to testosterone was similar in both the periods but the ratio was higher than that in the control (non-challenged) birds. The experiment showed that territorial aggression triggered hormonal pathways differently depending on the stage of the breeding cycle [24].

Fathering behaviour in mammals is rare and only 3−5% of mammals exhibit biparental care whereas it's the most common in birds. RNA sequencing identified a group of genes in male prairie voles (field mice) located in their medial pre-optic area (MPOA) which are involved in various processes like immune function, metabolism, synaptic plasticity and remodelling of dendritic spines. This study showed how gene expression changed across the transition to fatherhood and affected the male parenting behaviour with respect to different social experiences [1].

Lastly, all animals have a generic pattern of basic instinctive behaviours but their behaviour demands changes as per the change in the internal and external environments. Social learning of a juvenile bird initially happens by observing parents (vertical transmission) and subsequently by observing others (horizontal/oblique transmission). Early social experience with parents affect foraging decisions but later social environments lead the juveniles to modify their behaviour [25]. In the chick, a common generic pattern underlies both hatching and walking but modulatory inputs can essentially change all the functional components of a single anatomically defined network. Some of the probable mechanisms of these neuromodulations are i) serotonin induced change in K-current that modulates membrane potential and ii) change in synaptic efficacy by regulating the amount of neurotransmitter release thus affecting Excitatory

post-synaptic potentials (EPSPs) and Inhibitory post-synaptic potentials (IPSPs) [26]. Another study on female Nicrophorus vespilloides (Burying beetle) found upregulation of seven neuropeptides especially two kinins (tachykinin and sulphakinin) during parenting which may explain the evolution of social and parental skill in animal kingdom as a whole [27].

The study of parenting habits is absolutely fascinating. The most intriguing question is what makes a good parent? Is it biological nature or experience or both? It is important to understand the neuro-hormonal basis of the parenting behaviour which has mostly been studied in animal and avian models. In mammals, the most commonly studied species are rats, mice and rhesus monkeys. These studies in animal models have yielded a rich source of hypotheses for human studies.

The neurobiology of mothering has been linked to the level of falling progesterone and rising oestrogen, prolactin and most importantly oxytocin which act in the medial pre-optic area (MPOA) to make pup stimuli salient to the new mother which results in release of dopamine and involvement of mesolimbo-cortical 'motivation system' [28, 29].

The neurobiology of fathering is far less studied than the neurobiology of mothering. The most consistent finding from the animal literature is that testosterone is usually antithetical to male parenting [30]. Testosterone, on the other hand, decreases in men who become involved fathers [31].

Parents in modern society face tremendous challenge to provide quality childcare that increasingly strain sensitive nurturing of the child. There is mounting evidence that the very structure of the human brain is altered by the cognitive challenges inherent in learning how to parent [31].

CONCLUSION:

In future, the great variety of parental caregiving systems displayed by animals should be thoroughly explored and most importantly, cross-talk between animal and human subjects research should be promoted.

REFERENCES:

1. Seelke AMH, Bond JM, Simmons TC, Stolzenburg D, Rhemtulla M, Bales KL. Fatherhood alters gene expression within the MPOA. Environmental Epigenetics 2018; 4(4): dvy026

2. Cockburn A. Prevalence of different modes of parental care in birds. Proceedings of the Royal Society of London B: Biological Sciences 2006; 273(1592):1375–1383.

3. Rincón, Del AG, Ferrer ES, Fathi H and Navas VG. "Mating Strategies, Parental Investment and Mutual Ornamentation in Iberian Rock Sparrows (Petronia petronia)." Behaviour 2013; 150(14) : 1641-663.

4. Szentirmai I, Komdeur J & Székely T. What makes a nest-building male successful? Male behavior and female care in penduline tits. Behavioral Ecology 2005; 16(6), pp.994-1000. doi: 10.1093/beheco/ari080.

5. Davies GH. The life of birds, parenthood, 1970. http://www.pbs.org/lifeofbirds/home/index. [last accessed on 01-09-2020]

6. Van Rhijn J. Phylogenetical constraints in the evolution of parental care strategies in birds. Neth J Zool 1984; 34:103-122.

7. Elżanowski A. The evolution of parental care in birds with reference to fossil embryos. In: Ilyichev VD, Gavrilov VM. Eds. Acta XVIII Congressus Internationalis Ornithologici Moscow, Nauka 1985;1: 178–183.

8. Handford P, Mares MA. The mating systems of ratites and tinamous: an evolutionary perspective. Biol J Linn Soc 1985; 25:77-104.

9. Ligon JD. The Evolution of Avian Breeding Systems. Oxford University Press, Oxford. 1999

10. Vehrencamp SL. Evolutionary routes to joint-female nesting in birds. Behavioral Ecology 2000, 11 (3): 334–344, https://doi.org/10.1093/beheco/11.3.334.

11. Lack DL. In: Ecological adaptations for breeding in birds. London: Methuen;1968.

12. Brown JL. Helping communal breeding in birds: Ecology and evolution 2014; 504. Princeton University Press.

13. Bradbury JW. The evolution of leks. In: Editors-Alexander RD, Tinkle DW. Natural selection and social behavior: Recent research and new theory. New York: Chiron Press;1981. p. 138–169.

14. Mulder RA, Dunn PO, Cockburn A, Lazenby-Cohen KA, Howell MJ. Helpers liberate female fairy-wrens from constraints on extra-pair mate

choice. Proc. R. Soc. Lond. B 1994; 255(1344):223–229.
15. Gowaty PA. Field studies of parental care in birds: New data focus questions on variation among females. In: Advances in the Study of Behavior 1996; 25: 477–531.
16. Verner J. Evolution of polygamy in the long-billed marsh wren. Evolution 1964; 18(2):252-261.
17. "Mother birds know best -- even before birth." University of Cambridge. ScienceDaily. 27 March 2010.https://www.sciencedaily.com/releases/2010/03/100311141209.htm [last accessed on 01/09/2020]
18. Verboven N, Monaghan P, Evans DM, Schwabi H, Evans M, Whitelaw C et al. Maternal condition, yolk androgens and offspring performance: a supplemental feeding experiment in the lesser black-backed gull (Larus fuscus). Proc Biol Sci. 2003 Nov 7; 270(1530): 2223–2232. doi: 10.1098/rspb.2003.2496
19. Rutstein AN, Gilbert L, Peter JB. Slater and Jeff A. Graves Sex-specific patterns of yolk androgen allocation depend on maternal diet in the zebra finch. Behavioral Ecology 2005; 16(1): 62-69. doi:10.1093/beheco/arh123
20. Visser ME., Holleman LJM and Caro SP. Temperature has a causal effect on avian timing of reproduction. Proc. R. Soc. B.2009; 276: 2323–2331
21. Grindstaff JL, Brodie ED 3rd, Ketterson ED. Immune function across generations: integrating mechanism and evolutionary process in maternal antibody transmission. Proc Biol Sci. 2003;270(1531):2309-2319. doi:10.1098/rspb.2003.2485
22. Qvarnström A. Experimentally increased badge size increases male competition and reduces male parental care in the collared flycatcher. Proc. R. Soc. Lond. B: 1997; 264: 1225-1231; DOI: 10.1098/rspb.1997.0169.
23. Vleck CM and Vleck D. Hormones and regulation of parental behavior in birds. In: Hormones and Reproduction of vertebrates. Elsevier; 2011:181-203.
24. Adreani NM, Goymann W and Mentesana L. Not one hormone or another: Aggression differentially affects progesterone and testosterone in a south american ovenbird. Hormones and behavior 2018, 105:104–109.
25. Franks VR, Ewen JG, McCready M, Thorogood R. Copy parents or follow friends? juvenile foraging behaviour changes with social environment. bioRxiv. doi: https://doi.org/10.1101/429688
26. Harris RM-Warrick and Marder E. Modulation of neural networks for behavior. Annual review of neuroscience, 14(1):39–57, 1991.
27. Cunningham CB, Badgett MJ, Meagher RB, Orlando R & Moore AJ. Ethological principles predict the neuropeptides co-opted to influence parenting. Nature communications 2017; 8 : 14225 doi: 10.1038/ncomms14225
28. Bales KL. Parenting in animals. Curr Opin Psychol. 2017 ;15: 93–98. doi: 10.1016/j.copsyc.2017.02.026
29. Numan M, Young LJ. Neural mechanisms of mother-infant bonding and pair bonding: Similarities, differences, and broader implications. Hormones and Behavior. 2016;77:98–112.
30. Bales KL, Saltzman W. Fathering in rodents: Neurobiological substrates and consequences for offspring. Hormones and Behavior. 2016;77:249–259.
31. Riling JK. The neural and hormonal bases of human parental care. Neuropsychologia. 2013; 51(4):731-47. doi:10.1016/j.neuropsychologia.2012.12.017.

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EFFICACY OF EARLY RESUSCITATION AND RECURRENT MONITORING IN TRAUMATIC SHOCK PATIENTS

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ABSTRACT

Introduction: Clinically, patients of Traumatic Shock present with weakness, increased thirst, restlessness, dehydration, low blood pressure, absent or weak pulse, and altered sensorium. Treatment begins with resuscitation, control of bleeding, extra cellular fluid replacement and local treatment of cause. Hemostatic resuscitation is a recent concept in patients of severe trauma. It is a key component of damage control resuscitation. After resuscitation, intensive monitoring is to be done for better results. The aim of present study was to observe the efficacy of early resuscitation and recurrent monitoring to reduce morbidity and mortality in patients of traumatic shock.

Material and Methods: The study was conducted in 50 patients of Traumatic Shock, admitted in Pt. Ram Prasad Bismil Hospital, affiliated to Autonomous State Medical College, Shahjahanpur, (U.P.), from 15th November 2019 to 15th August 2020. The study subjects suffered from burn injuries, chest injuries, abdominal injurious and other multiple injuries. This study observed the efficacy of early resuscitation and recurrent monitoring in patients of traumatic shock. Prior approval from Institutional ethics committee was obtained.

Results: The causes of Traumatic Shock in this study are burn injuries with more than 50% TBSA (36%), Multiple (100%),CT chest (20%), CT abdomen (16%)and CT head (14%).Out of total 50 patients, 64% cases were treated by conservative treatment and 36% cases were treated by surgical treatment. The overall mortality was 26%.

Conclusion: Resuscitation rather damage control resuscitation is very important in the management of traumatic shock. Resuscitation and intensive monitoring plays an important role for better survival.

Keywords: Traumatic Shock, imaging techniques, damage control resuscitation, monitoring

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INTRODUCTION

Shock due to an injury in an otherwise healthy patient is reported as “Traumatic Shock”. Also, it is characterized by severe tissue damage due to severe injuries, burn injuries or multiple fractures. It is a condition in which circulation fails to meet the nutritional requirement of the cells and at the same time fails to remove the metabolic waste products. Uncontrolled bleeding remains a leading cause of prevenFigure death after trauma [1]. Burn shock is a specific form arising from severe injury by heat. The most important apparent abnormality in this is loss of plasma or exudates from burnt surface. Burn shock is a unique combination of hypovolemic and distributive shock, accompanied by cardiogenic shock. Chest trauma accounts for approximately 20%- 25% of mortality in trauma patient [2,3].These patients may present as tension pneumothorax, pneumothorax, open pneumothorax, hemothorax, flail chest, pulmonary contusion, cardiac tamponade etc. Abdominal injuries may be life threatening and should be approached cautiously. So, patients of abdominal trauma should have rapid assessment, stabilization and early surgical consultation to

maximize the chances of successful outcome [4]. Clinically, patients of Traumatic Shock present symptoms and signs in the form of weakness, increased thirst, restlessness, sweating, dehydration, low blood pressure, absent or weak pulse with tachycardia and altered sensorium etc. Treatment of traumatic shock begins with resuscitation, control of bleeding if any and local treatment of cause. If there is blood loss, it is best replaced by fresh blood having active red cells, platelets, sFigure and labels coagulation factors and plasma proteins [5]. Crystalloid and colloid in the pre-hospital resuscitation setting has been associated with an increased risk of coagulopathy [6]. Hemostatic resuscitation is a recent concept in patients of severe traumatic injury. It is a key component of damage control resuscitation. It involves resuscitation with blood components with the aim to maintain circulation volume, limit ongoing bleeding, and prevent the lethal triad of hypothermia, acidosis and acute coagulopathy. The Concept of Damage Control Resuscitation (DCR) in crisis is well suited to the care of the critically ill patients. Severely injured patients who sustain large blood loss often develops the lethal triad of coagulopathy, hypothermia and metabolic acidosis [7]. Each of these disturbances ultimately produces irreversible shock [8]. DCR attempts to prevent, rather than to treat coagulopathy as the most treaFigure arm of the lethal triad [9,10]. Use of this approach has been demonstrated to decrease mortality, facilitate earlier abdomen closure and decrease the length of stay [11,12]. A systolic blood pressure goal of 80mm Hg to 90 mm Hg was deemed beneficial before surgery [13]. After DCR, recurrent monitoring in the form of continuous heart rate, oxygen saturation, non-invasive blood pressure and hourly urine output measurement is to be done. Apart from this, many patients require aggressive invasive intensive monitoring like central venous pressure and invasive blood pressure. The degree of lactic acidosis should be measured as it is sensitive for both diagnosis of shock and monitoring the response of therapy. Therefore, the broad aim in this study was to observe the efficacy of early resuscitation and recurrent monitoring to reduce the mortality and morbidity in patients of traumatic shock.

MATERIAL AND METHODS:

The present study was conducted among 50 patients of Traumatic shock, admitted in Pt. Ram Prasad Bismil Hospital, affiliated to Autonomous State Medical College Shahjahanpur, (U.P.), from 15th November 2019 to 15th August 2020. The study subjects had burn injuries, chest injuries, abdominal injuries and other multiple injuries. A written consent from all the patients and institutional ethics committee approval were obtained.

Inclusion Criteria: Patients willing to participate in this study and Patients of Traumatic Shock especially burn injury (more than 50%TBSA), Chest injuries, Abdominal injuries and some other multiple injuries were excluded.

Exclusion Criteria: Non Traumatic cases of shock and Patients having co-morbidities were excluded.

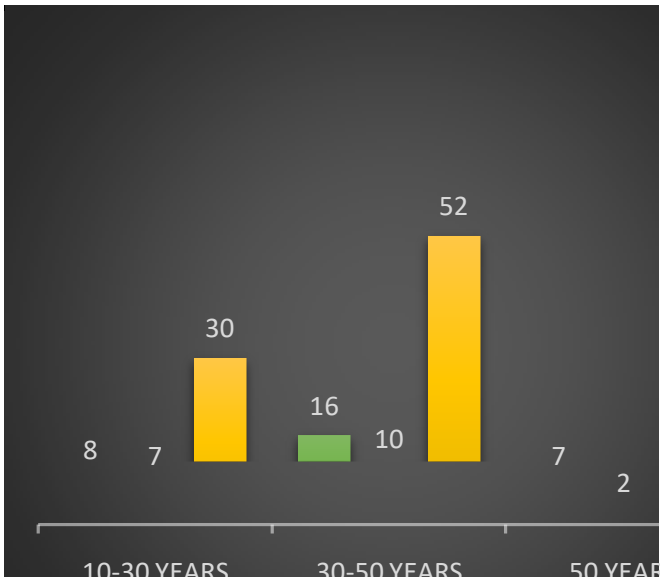
Investigations: After routine blood investigations (CBC, Blood Sugar, KFT & Sodium & Potassium, Prothrombin time, Platelet count & serum lactate) following imaging techniques (X-Ray chest, abdomen and other involved parts, CECT chest, CECT abdomen and CECT head) were performed.

Data was analysed using SPSS version 22.0 and presented in form of Figures and graphs. .

RESULTS:

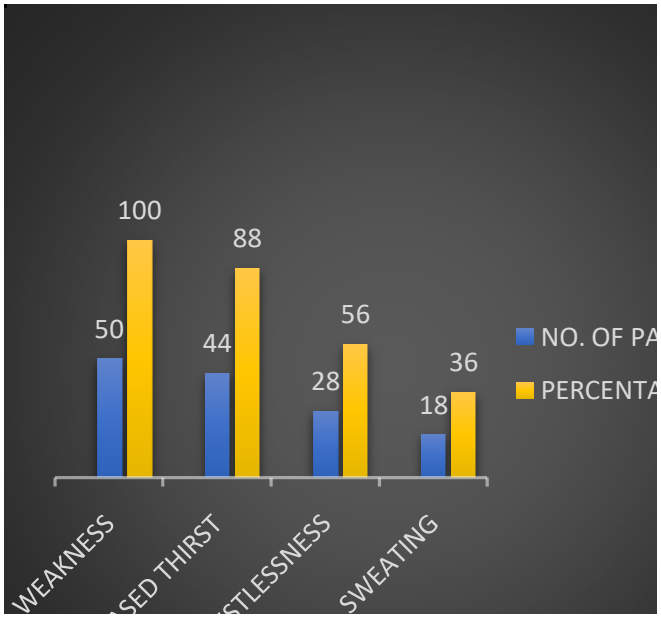
Out of the total 50 patients, a higher proportion presented with burn injury (36%), chest injury (20%), abdominal injury (16%) & other multiple injuries (28%). About 64% patients were treated by conservative treatment while remaining 36% were treated surgically. Overall mortality observed was 26%.

Figure 1: Distribution of study subjects according to age group and gender.



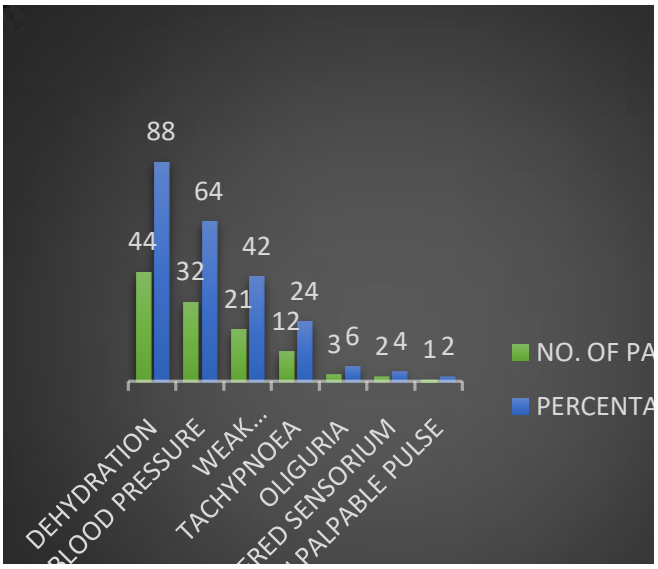
This study includes 31 males and 19 females. In the ratio of male to female 1.6:1, maximum number of patients was between age group 30 years to 50 years with male preponderance.

Figure 2: Distribution of study subjects according to symptoms



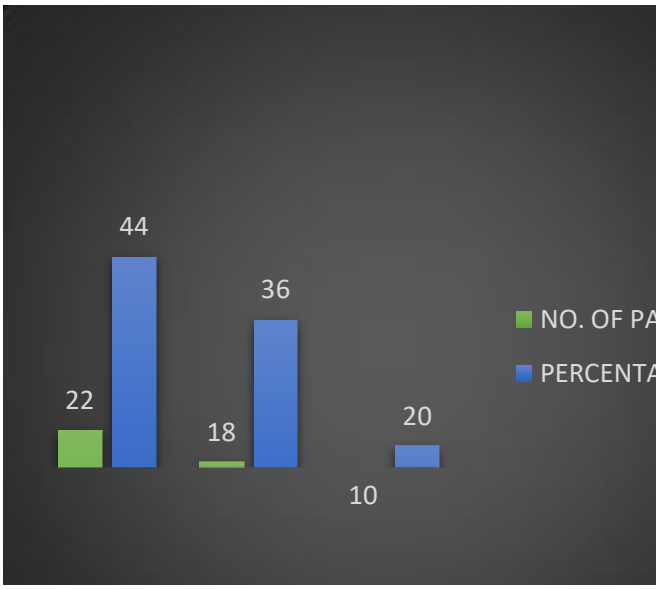
Weakness was the most common symptom (100%), followed by increased thirst (88%), restlessness (56%) and sweating (36%).

3: Distribution of study subjects according to signs



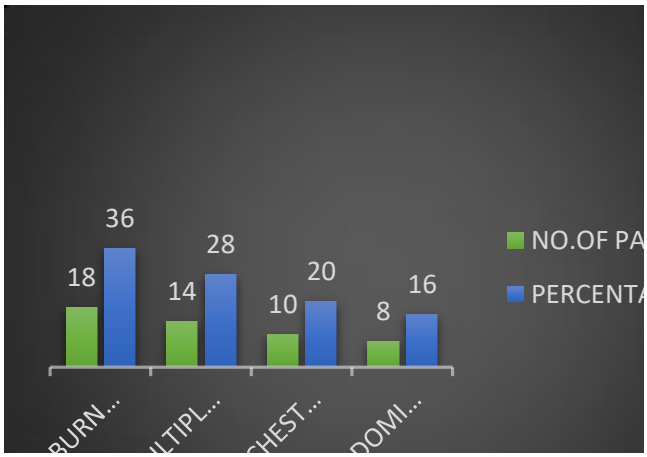
Dehydration was the most common sign encountered in 50 patients (88%), followed by Low blood Pressure (64%), Weak Pulse with Tachycardia (42%), Tachypnoea (24%), Oliguria (6%), Altered Sensorium (4%) and Non palpable pulse (2%).

Figure 4: Distribution of study subjects according to the stage of Shock



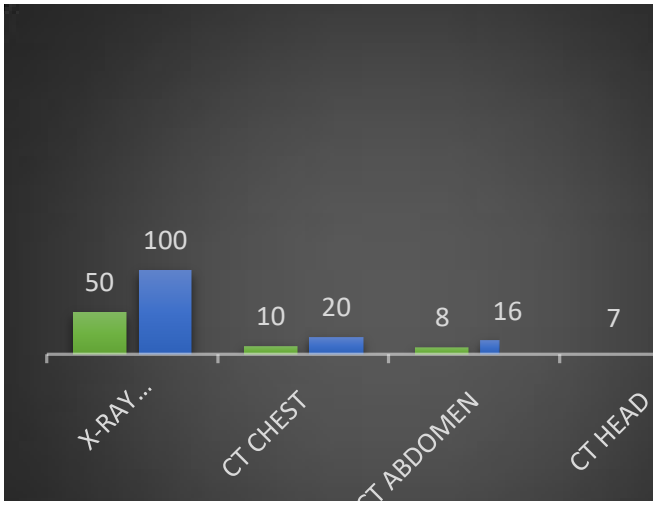
There were 44% mild cases followed by 36% Moderate cases and 20 % severe shock.

Figure 5: Distribution of study subjects according to cause of Traumatic Shock



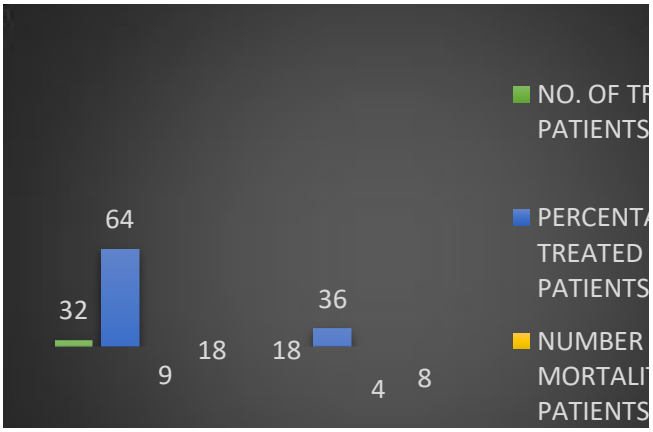
Above Figure shows 36% burn injury patients, followed by 28% multiple injury, 20% chest injury and 16 % abdominal injury.

Figure 6: Distribution of study subjects according to imaging techniques



In above study X-Ray was done in all 50 patients (100%), followed by chest (20%) ,CT Abdomen (16%) and CT head (14%).

Figure 7: Distribution of study subjects according to treatment and mortality



Above Figure shows 64% cases were treated by Conservative treatment and 36% cases were treatment by Surgical treatment. Overall mortality in our study was 26%.

DISCUSSION: The study was done to discuss the efficacy of early resuscitation and recurrent monitoring in a traumatic shock patient. Traumatic shock is a conventional term indicating shock arising from trauma in a broad sense, but is of practical benefit to explain complex systemic dysfunction following multiple traumas. Resuscitation rather damage control resuscitation is very important in the management of traumatic shock. The principle objectives of fluid and blood resuscitation in Traumatic shock are to restore intravascular volume sufficient to maintain oxygen carrying capacity and tissue perfusions for adequate cellular oxygen delivery and to prevent or correct derangement in coagulation [14]. Damage control resuscitation is more than a single technique or treatment but rather many strategies that combine resuscitation and surgical care. It focuses on rapid resuscitation with blood, rapid hemorrhage control and correction of metabolic derangements. Trauma triad of death is a medical term describing the combination of hypothermia, acidosis and coagulopathy [15]. This combination is commonly seen in patients who have sustained severe traumatic injury and results in a significant rise in mortality [16].

In our study, the ratio of male to female was 1.6 and commonest age group was between 30 years to 50 years. While in other studies male to female ratio was 2.7:1[17]. Several studies have indicated that males are major risk factors for infections and multiple organs failure after trauma and blood loss [18,19]. The commonest age group observed in other studies was younger people less than 45 years of age [20,21]. These results are similar to our study. The symptoms observed were weakness (100%) followed by increased thirst (88%), restlessness (56%) and sweating (36%) in this study. The signs were Dehydration (88%) followed by Low blood Pressure (64%), Weak Pulse and tachycardia (42%), Tachypnoea (24%), Oliguria (6%), Altered Sensorium (4%) and Non palpable pulse (2%) in

the present study. This can be compared to the study by Gregory et al were tachycardia was present in 35-39% [22].The incidence of post traumatic acute kidney injury varied from 0.098 to 8.4% in published series[23,24], while in our study it was found to be 6%. Altered sensorium in our study was found to be 4% while in another study it was found to be 2.1% [25]. Overall mortality in this study was 26% as compared to 30% mortality in a previous study [26].

CONCLUSION:

Managing traumatic shock patients is complex and difficult. The mortality rate of these patients remains high. Resuscitation and intensive monitoring plays an important role for better survival.

REFERENCES:

1. Sisak, K.; Dewar, D.; Butcher, N.; King, K.; Evans, J.; Miller, M.; et al. The treatment of traumatic shock: Recent advances and unresolved questions. European Journal of Trauma and Emergency surgery 2011; 37: 567-575.
2. Gaillard M, Harve C, Mandin L, Raynaud P. Mortality prognostic factors in chest injuries. J. Trauma 1990, 30(1): 93-6
3. Inthorn D, Huf R. Thoracic trauma in multiple trauma. Anasthesiol Intensivmed Notfallmed Schmerzther. 1992;27:498–501.
4. Goksu Afacan. Abdominal Trauma September 19, 2018. DOI: 10.5772/intechopen.76474. Available: https://www.intechopen.com/books/trauma-surgery/abdominal-trauma
5. Repine TB, Perkins JG, Kauvar DS, Blackborne L. The use of fresh whole blood in massive transfusion. J Trauma. 2006;60:S59–69.
6. Mittermayr M, Streif W, Haas T, Fries D, Velik-Salchner C, Klingler A, Oswald E, Bach C, Schnapka-Koepf M, Innerhofer P. Hemostatic changes after crystalloid or colloid fluid administration during major orthopedic surgery: the role of fibrinogen administration. Anesth Analg. 2007 Oct;105(4):905-17,
7. Eddy VA, Morris JA Jr, Cullinane DC. Hypothermia, coagulopathy, and acidosis. Surg Clin North Am. 2000 Jun;80(3):845-54. doi: 10.1016/s0039-6109(05)70099-2. PMID: 10897264.
8. Scalea T. What's new in Trauma in past 10years. Int. Anesthesiol Clin 2002, 40:1-17.
9. Borgman MA, Spinella PC, Perkins JG, Grathwohl KW, Repine T, Beekley AC, Sebesta J, Jenkins D, Wade CE, Holcomb JB. The ratio of blood products transfused affects mortality in patients receiving massive transfusions at a combat support hospital. J Trauma. 2007 Oct;63(4):805-13.
10. Beekley AC. Damage control resuscitation: a sensible approach to the exsanguinating surgical patient. Crit Care Med. 2008 Jul;36(7 Suppl):S267-74.
11. Cannon JW, Khan MA, Raja AS, Cohen MJ, Como JJ, Cotton BA et al. Damage control resuscitation in patients with severe traumatic hemorrhage: A practice management guideline from the Eastern Association for the Surgery of Trauma. J Trauma Acute Care Surg. 2017 Mar;82(3):605-617.
12. Beecher H. K. Preparation of battle casualties for surgery. Ann Surg 1945; 121(6): 69- 92
13. Duchesne JC, McSwain NE Jr, Cotton BA, Hunt JP, Dellavolpe J, Lafaro K, Marr AB, Gonzalez EA, Phelan HA, Bilski T, Greiffenstein P, Barbeau JM, Rennie KV, Baker CC, Brohi K, Jenkins DH, Rotondo M. Damage control resuscitation: the new face of damage control. J Trauma. 2010 Oct;69(4):976-90.
14. David M. Somand; Kevin R. Ward. Fluid and Blood Resuscitation in Traumatic Shock. In Tintinalli's Emergency Medicine: A Comprehensive Study Guide, 8e.
15. Mikhail J. The Trauma triad of death: hypothermia ,acidosis and coagulopathy AACN Clin issues; 10(1): 85-94
16. Lewis AM. Trauma triad of death. Emergency! Nursing. 2000 Mar;30(3):62-4.
17. Bolandparvaz S, Yadollahi M, Abbasi HR, Anvar M. Injury patterns among various age and gender groups of trauma patients in southern Iran: A cross-sectional study. Medicine (Baltimore). 2017 Oct;96(41):e7812.
18. George RL, McGwin G Jr, Windham ST, Melton SM, Metzger J, Chaudry IH, et al. Age-related gender differential in outcome after blunt or penetrating trauma. Shock (Augusta, Ga.). 2003 Jan;19(1):28-32.

19. Kher A, Wang M, Tsai BM, Pitcher JM, Greenbaum ES, Nagy RD, et al. Sex differences in the myocardial inflammatory response to acute injury. Shock (Augusta, Ga.). 2005 Jan;23(1):1-10.

20. Runje J.W, The cost of injury. Emerg Med Clin North Am 1993;11(1):241-253

21. Rossaint R, Cerny V, Coats TJ, Duranteau J, Fernández-Mondéjar E, Gordini G, Stahel PF, Hunt BJ, Neugebauer E, Spahn DR. Key issues in advanced bleeding care in trauma. Shock. 2006 Oct;26(4):322-31.

22. Victorino GP, Bettistelle FD, Wisner DH. Journal of American College of Surgeon 2003; 196(5): 679-684

23. Morris JA Jr, Mucha P Jr, Ross SE, Moore BF, Hoyt DB, Gentilello L, Landercasper J, Feliciano DV, Shackford SR. Acute posttraumatic renal failure: a multicenter perspective. J Trauma. 1991 Dec;31(12):1584-90.

24. Regel G, Lobenhoffer P, Grotz M, Pape HC, Lehmann U, Tscherne H. Treatment results of patients with multiple trauma: an analysis of 3406 cases treated between 1972 and 1991 at a German Level I Trauma Center. J Trauma. 1995 Jan;38(1):70-8.

25. Xiao HY, Wang YX, Xu TD, Zhu HD, Guo SB, Wang Z, Yu XZ. Evaluation and treatment of altered mental status patients in the emergency department: Life in the fast lane. World J Emerg Med. 2012;3(4):270-7.

26. Levy MM, Dellinger RP, Townsend SR, Linde-Zwirble WT, Marshall, JC, Bion J et al. The Surviving Sepsis Campaign: results of an international guideline-based performance improvement program targeting severe sepsis. *Intensive Care Med*. 2010;36(2):222-231.

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A STUDY OF TOXICITY OF PACLITAXEL AND CARBOPLATIN CHEMOTHERAPY IN PATIENTS WITH CANCER OVARY

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ABSTRACT

Introduction: Ovarian cancer is one of the most common gynecologic cancers. The World Health Organization categorized ovarian cancer on the basis of tissue of origin. The prognosis for women with advanced stage disease is poor. Paclitaxel-platinum doublet chemotherapy and optimal cytoreductive surgery are the standard of care for advanced epithelial ovarian carcinoma. Neutropenia is the most serious hematologic toxicity of cancer chemotherapy. Neuropathy is often associated with Paclitaxel chemotherapy. Peripheral neuropathy negatively impacts quality of life in patients. The most common clinical neurotoxicity associated with paclitaxel administration is a predominantly sensory peripheral neuropathy. This study was undertaken to assess the safety of Paclitaxel Carboplatin chemotherapy regimen in patients with Cancer Ovary and to observe the toxicities.

Material and Methods: This was an observation study. All patients with epithelial cancer ovary and received Paclitaxel plus Carboplatin chemotherapy were included in this study. The patient characteristics like Age of patient, ECOG performance status, histopathology of the tumour, Stage of disease at presentation were recorded. The performance status was assessed before and after chemotherapy Staging was done using FIGO classification. Toxicities were recorded at the end of each cycle.

Results: A total of 78 patients were studied in three years. Mean age was 52.37 years. The majority of the patients presented with stage 3 disease and most of the patients were found to have serous carcinoma. Sensory peripheral neuropathy was seen in 25.64% patients and Motor Neuropathy11.54% of patients. Neutropenia was the most important haematological toxicity and 7 patients needed chemotherapy postponement.

Conclusion: Sensory neuropathy is more than motor neuropathy. Chemotherapy was well tolerated by most of the patients. Neutropenia was the most important toxicity which resulted in postponement of chemotherapy.

Key words: Cancer ovary, paclitaxel carboplatin, chemotherapy, toxicity.

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INTRODUCTION

Ovarian cancer is one of the most common gynecologic cancers that rank third after cervical and uterine cancer. It is the 7th cause of death and morbidity in females worldwide[1]. Women are at risk of developing ovarian cancer 1 in 75 and 1 in 100 will be at risk of death due to this fatal condition[2]. The World Health Organization categorized ovarian cancer on the basis of tissue of origin: Epithelial surface tumor (65%), ovarian germ cell (15%), sex cord tumor (10%), metastatic ovarian tumor (5%), and miscellaneous ovarian tumor (5%). In most of the population-based cancer registries in India, ovarian cancer is the third leading site of cancer among women, trailing behind cervix and breast cancer[3,4,5]. India with more than one billion population has a huge burden of cancer ovary. Most of the ovarian cancers are

initially operated by general gynecologists since trained gynecological oncologists are very few in the country[5,6].The hindrances for not diagnosing this tumor early are late presentation and ineffective screening modalities. According to National Comprehensive Cancer Network recommendations, monitoring of CA-125 concentration is not obligatory for follow-up, but it is common in everyday clinical practice. Ovarian tumors are often difficult to detect until they are advanced in stage or size, as symptoms are vague and insidious. Radical Surgery still remains the cornerstone towards cure in the management of cancer ovary[6,7,8].

Paclitaxel and carboplatin became the standard of care in the management of epithelial ovarian carcinoma. Complete resection of all macroscopic disease (optimal cytoreduction) is the single most important independent prognostic factor in advanced early ovarian cancer (EOC). Neoadjuvant chemotherapy followed by interval debulking surgery has been proposed in the management of advanced ovarian cancer. For Stage III and IV ovarian cancers, almost 2/3rd of the participants have the experience of complete cytoreduction after neoadjuvant chemotherapy[8,9]. Chemotherapy plays a pivotal role in the management of ca ovary. It is indicated in all patients with high grade disease irrespective of the stage of disease and in patients with stage 1c and above. Paclitaxel-platinum doublet chemotherapy and optimal cytoreductive surgery are the standard of care for advanced epithelial ovarian carcinoma. The Paclitaxel Carboplatin regimen has been studied as adjuvant therapy in ovarian cancer and primary treatment of relapsed platinum-sensitive ovarian cancer. The standard dose of this regimen is 175mg/m^2(Body surface area) of Paclitaxel and Carboplatin dose of Area Under Curve (AUC) 5 to 6 both given as IV administration. Both the drugs are repeated every 21 days[8,10,11,12]. Paclitaxel injection produces hypersensitivity reactions in about 10% of patients. Routine prophylactic pre-medications should be given prior to paclitaxel administration. Cytotoxic chemotherapy predictably suppresses the hematopoietic system, impairing host protective mechanisms. Neutropenia is the most serious hematologic toxicity of cancer chemotherapy, often limiting the doses of chemotherapy that can be tolerated. The degree and duration of the neutropenia determine the risk of infection. Because neutropenia reduces the signs and symptoms of infection, patients with neutropenia often may present with fever as the only sign of infection[11,12]. Neuropathy is often associated with Paclitaxel chemotherapy. Peripheral neuropathy negatively impacts quality of life in cancer patients and survivors. 20–100% of patients develop a condition known as chemotherapy-induced peripheral neuropathy (CIPN). CIPN occurs when peripheral nerves are damaged, resulting in abnormal sensory function, and pain or loss of motor control. The most common clinical neurotoxicity associated with paclitaxel administration is a predominantly sensory peripheral neuropathy. The neurotoxicity is dose- and infusion-duration related, and most frequently occurs when the dose of paclitaxel per administration exceeds 250 mg/m^2 infused over 24 hours[13,14,15,16]. This study was undertaken with the following objectives

To study the safety of Paclitaxel Carboplatin chemotherapy regimen in patients with Cancer Ovary and to observe the toxicities

To study the age distribution, performance status, histological type and stage of disease at presentation.

MATERIAL AND METHODS

This observation study was conducted at a Tertiary cancer care centre of South Kerala for a period of THREE years from August 2016 to July 2019 after getting clearance from the Institutional Research committee and the Institutional Ethics committee. The study was conducted at the cancer department where patients received chemotherapy mainly in the day care chemotherapy ward. All patients with epithelial cancer ovary who were having indication for chemotherapy and received Paclitaxel plus Carboplatin chemotherapy were included in this study after getting informed consent from all the patients. Patients above 75 years of age and with ECOG performance 3 and above were excluded from this study. The patient characteristics like Age of patient, ECOG performance status, histopathology of the tumour, Stage of disease at presentation were recorded. The performance status was assessed before and after chemotherapy Staging was done using FIGO classification 2014.

GRADE	ECOG PERFORMANCE STATUS
0	Fully active, able to carry on all pre-disease performance without restriction
1	Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature, e.g., light house work, office work
2	Ambulatory and capable of all self-care but unable to carry out any work activities; up and about more than 50% of waking hours
3	Capable of only limited self-care; confined to bed or chair more than 50% of waking hours
4	Completely disabled; cannot carry on any self-care; totally confined to bed or chair
5	Dead

FIGO staging for Ca Ovary

Stage 1A: Tumor limited to 1 ovary, capsule intact, no tumor on surface, negative washings.

Stage 1B: Tumor involves both ovaries otherwise like IA.

Stage 1C: Tumor limited to1 or both ovaries with surgical spill, and/or Capsule rupture before surgery or tumor on ovarian surface, and/or Malignant cells in the ascites or peritoneal washings

Stage 2A: Extension and/or implant on uterus and/or Fallopian tubes

Stage 2B: Extension to other pelvic intra peritoneal tissues

Stage 3A: Positive retroperitoneal lymph nodes and /or microscopic metastasis beyond the pelvis

Stage 3B: Macroscopic, extra pelvic, peritoneal metastasis $\leq$ 2 cm $\pm$ positive retroperitoneal lymph nodes. Includes extension to capsule of liver/spleen.

Stage 3C: Macroscopic, extra pelvic, peritoneal metastasis >2 cm $\pm$ positive retroperitoneal lymph nodes. Includes extension to capsule of liver/spleen

Stage 4A: Pleural effusion with positive cytology

Stage 4B: Hepatic and/or splenic parenchymal metastasis, metastasis to extra-abdominal organs (including inguinal lymph nodes and lymph nodes outside of the abdominal cavity

The dose of Paclitaxel was 175mg/m^2 of body surface area and the dose of Carboplatin was Area under curve (AUC) 5 to 6. Both the drugs were given as IV infusion on day 1 and Paclitaxel was given as three hour infusion prior to Carboplatin. All the patients received premedication with Steroids, Antiemetic andAntihistamine. Dexamethasone was the steroid of choice, and Pheniramine was used as antihistamine. Ondansetron and Granisetron were used as antiemetic. The chemotherapy regimen consists of 6 cycles of the drugs being repeated every 21 days. The response to the treatment was assessed by doing serum CA-125 and by doing USG-Abdomen. Toxicities were recorded at the end of each cycle and were graded accordingly using the National Cancer Institute- Common Terminology Criteria version 4. Peripheral sensory Neuropathy was graded as

Grade 1: Asymptomatic; loss of deep tendon reflexes or paresthesia

Grade 2: Moderate symptoms; limiting instrumental activity of daily living (ADL)

Grade 3: Severe symptoms; limiting self-care ADL

Grade 4: Life-threatening consequences;urgent intervention indicated

Grade 5: Death

Peripheral Motor Neuropathy was observed and graded as

Grade 1: Asymptomatic; clinical or diagnostic observations only; intervention not indicated

Grade 2: Moderate symptoms; limiting instrumental ADL

Grade 3: Severe symptoms; limiting self-care ADL; assistive device indicated

Grade 4: Life-threatening consequences; urgent intervention indicated

Grade 5: Death

According to the National Cancer Institute-Common Toxicity Criteria, Nausea was graded from 0 to 3 and vomiting was graded from 0 to 4.Anaemia, Neutropenia and Thrombocytopenia were graded from 1 to 4. Note was taken of all the other adverse events related to this chemotherapy regimen. All the data were compiled and analysed on Microsoft Excel. For all qualitative variables proportion or percentage were calculated. For all quantitative variables, mean and standard deviation was calculated and test of significance was done using Inferential Analysis.

RESULTS

A total of 78 patients with radiological and pathological diagnosis of epithelial carcinoma ovary and received Paclitaxel Carboplatin chemotherapy were included in the study. Most of the patients received chemotherapy in the day care ward of our hospital.

The age of patients in this study ranged from 30 to 69 and the mean age was 52.37 years. The youngest patient was 30 years of age at diagnosis. The maximum number of patients was in the age group 51-60 years. The age distribution was 21-30 years - 1 patient (1.28%); 31-40 years there were 8 patients (10.26%); 41-50 years there were 18 patients (23.08%); 51-60 years there were 35 patients (44.87%) and in age group >60 there were 16 patients (20.51%). (Figure 1)

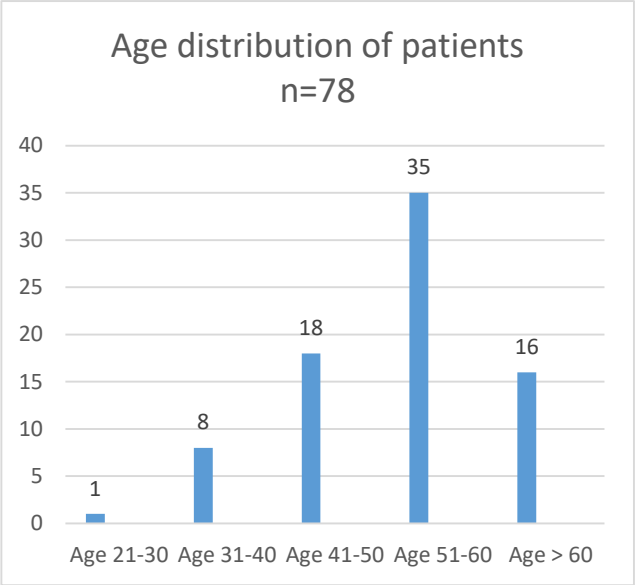

Figure 1: Age distribution of patients

Staging of the disease was done using the FIGO 2014 staging system. Out of the 78 patients at presentation Stage 1 was seen in 6(7.69%), stage 2 in 13(16.67%), stage 3 in 48(61.54%) and stage 4 in 11(14.10%) patients. The majority of the patients presented with stage 3 disease. (Figure 2)

The patients were classified according to the histopathology of the tumours and the result showed that the majority (39) of the patients had Serous carcinoma (50%). There were 10 patients with Mucinous carcinoma (12.82%). There were 18 patients with Endometrioid carcinoma (23.08%) and Clear cell carcinoma were found in 6 patients (7.69%) and 5 patients (6.41%) had Brenner carcinoma. The majority of the patients were found to have serous carcinoma of the ovary. (Figure 3)

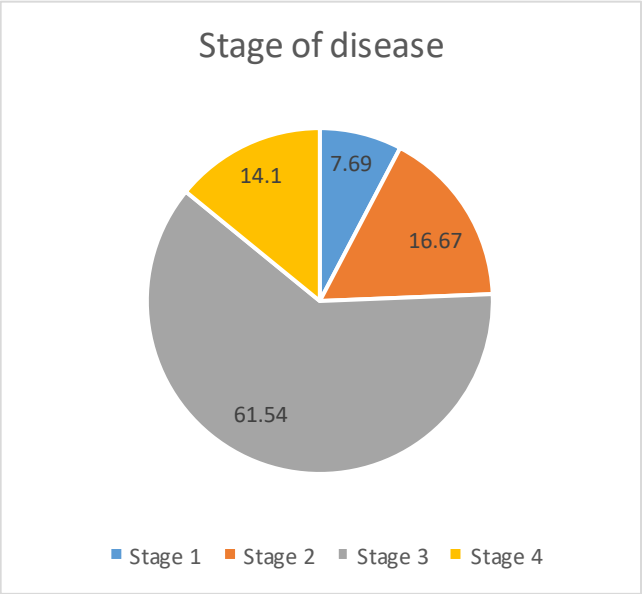

Figure 2: Distribution of patients as per Stage of disease

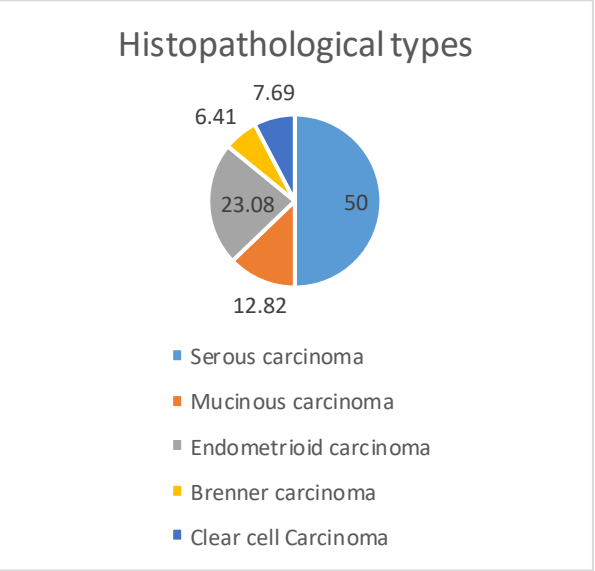

Figure 3: Distribution of patients as per Histological types

The performance status of the patient was assessed before and after chemotherapy using the ECOG performance scale. Pre Chemotherapy the performance status was ECOG 0- 8 (10.26%) patients, ECOG 1- 42 (53.84%) patients and ECOG 2- 28 (35.9%) patients. The majority of patients had a performance scale ECOG 1. After chemotherapy the performance scale was found to be ECOG 1 – 26 (33.33%) patients, ECOG 2- 32 (41.03%) patients, ECOG 3- 16 (20.51%) patients and ECOG

4 in 4 (5.13%) patients. The patients were found to have performance status 3 and 4 post chemotherapy whereas the majority of patients had ECOG 1 before chemotherapy. (Figure 4)

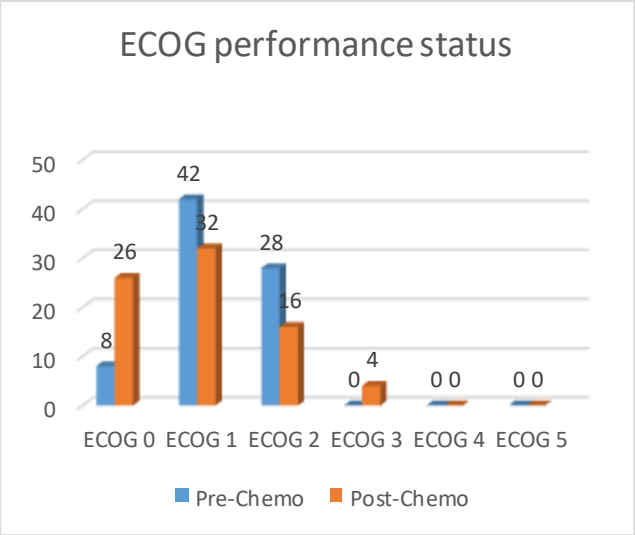

Figure 4: Distribution of patients according to ECOG performance status

On studying the occurrence and pattern of both Sensory and Motor Neuropathy the following was the result. Sensory peripheral neuropathy was seen in 20 (25.64%) patients and Motor Neuropathy was seen in 9 (11.54%) patients. Out of the sensory neuropathy patients 12 had Grade 1, 6 had Grade 2, and 2 had Grade 3 sensory neuropathy. Out of the 12 patients with motor neuropathy there were 5 patients with Grade 1, 3 patients with Grade 2 and 1 patient had Grade 3 motor neuropathy. (Figure 5)

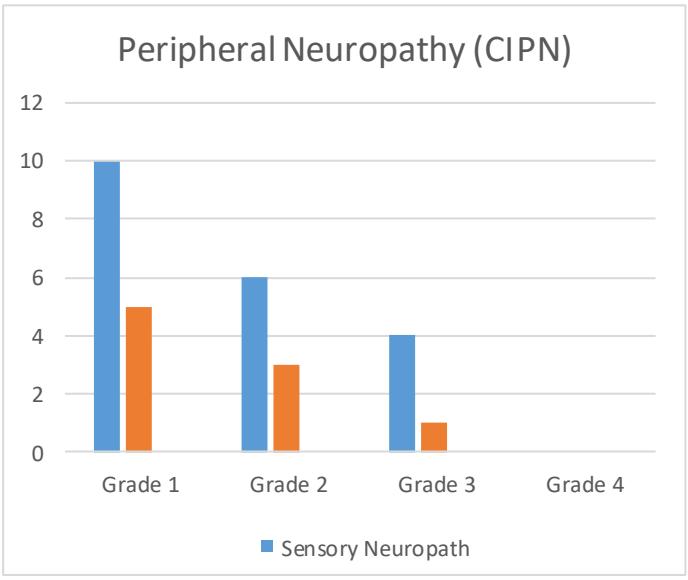

Figure 5: Distribution of patients according to Peripheral Neuropathy

The haematological toxicity of this chemotherapy regimen was studied and the result found was Anemia in 6 (7.69%) patients, Neutropenia in 15 (26.24%) patients and Thrombocytopenia was found in 2 (2.56%) patients only. Out of the 6 patients with Anemia 4 had Grade 2 and 2 patients had Grade 3 Anemia. Out of the 15 patients with Neutropenia 8 patients had Grade 2 and 7 patients had Grade 3 Neutropenia. Thrombocytosis of Grade 2 was seen in 2 patients. All the 7 patients with grade 3 neutropenia required postponement of chemotherapy.

Alopecia was seen in all the patients receiving chemotherapy and this was seen significantly after the second chemotherapy. Nausea was another major symptom and was found to be Grade 0 in 40(51.28%) patients, Grade 1in 28(35.90%) patients, Grade 2 in 9(11.54%) patients and only 1(1.28%) patient developed Grade 3 Nausea. Out of the 38 patients who had nausea, 7 had diarrhoea.

Vomiting was also graded and we found Grade 0 in 32(41.03%) patients, Grade 1 in 20 (25.64%) patients, Grade 2 in 25 (32.05%) patients and Grade 3 in 1(1.28%) patient.

The other symptoms that were associated with this chemotherapy regimen were Myalgia which was seen in 34 (43.59%) patients, Arthralgia in 23 (29.49%), Fatigue in 44 (56.41%) patients, Mucositis was seen in 16 (20.51%) patients and Diarrhoea in 7(8.97%) patients. 1 patient had developed Grade 1 hypersensitivity reaction but none of the patients had developed any severe allergic reaction.

DISCUSSION

This study was done to assess the toxicity of Paclitaxel Carboplatin chemotherapy regimen in patients with carcinoma ovary and also to study the Age, performance status, histological type and stage of disease at presentation. The study was done in 78 patients with epithelial carcinoma ovary who received chemotherapy with Paclitaxel and Carboplatin.

The age of the patients in the study population ranged from 30 to 69 years and the mean age was 52.37 years. In our study the stage of the patients at presentation was stage 1 in 6(7.69%), stage 2 in 13(16.67%), stage 3 in 48(61.54%) and stage 4 in 11(14.10%) patients. In the study by P Basu et al[9] in

218 patients with ca ovary the mean age at presentation was 48.8 years and more than 80% of the patients had stage 3 or 4 disease at the time of registration. Characteristics of patients in the Scottish Randomised Trial in Ovarian Cancer 1 by Paul A et al[17] the median age was found to be 59 in the 1077 patient population and 80.5% of patients had stage 3 or 4 disease.

The majority of the patients had serous carcinoma ovary (50%). There were 18 (23.08%) patients with Endometrioid carcinoma. Mucinous carcinoma was diagnosed in 10 (12.82%) patients, Clear cell carcinoma were found in 6 patients (7.69%) and Brenner carcinoma in 5 patients (6.41%). In the study by Paul A et al, 44% of the patients had serous carcinoma, 12% had Endometrioid cancer, 4% of Mucinous carcinoma and 5% had clear cell carcinoma.

The performance status of the study population was assessed before and after chemotherapy using the ECOG performance scale. Pre Chemotherapy the performance status was ECOG 0- 8 (10.26%) patients, ECOG 1- 42 (53.84%) patients and ECOG 2- 28 (35.9%) patients. The majority of patients had a performance scale ECOG 1 during the pre-chemotherapy assessment with no patients in the ECOG 3 or 4 performance scale. During post-chemotherapy the performance scale was found to be ECOG 1 – 26 (33.33%) patients, ECOG 2- 32 (41.03%) patients, ECOG 3- 16 (20.51%) patients and ECOG 4 in 4 (5.13%) patients. The patients were found to have performance status 3 and 4 post chemotherapy whereas the majority of patients had ECOG 1 before chemotherapy. In the study done by Shawky H et al[18], 55.6% of the patients presented with ECOG 1 status whereas Paul et al found 87% patients to have ECOG 0-1.

Peripheral neuropathy is the most important dose limiting toxicity of this chemotherapy regimen as reported in many literatures. We studied the sensory and motor neuropathy that occurred in our study population and found that sensory peripheral neuropathy was seen in 20 (25.64%) patients and Motor Neuropathy was seen in 9 (11.54%) patients. Out of the sensory neuropathy patients 12 had Grade 1, 6 had Grade 2, and 2 had Grade 3 sensory neuropathy. Out of the 12 patients with motor neuropathy there were 5 patients with Grade 1, 3 patients with Grade 2 and 1 patient had Grade 3 motor neuropathy.In the study by Shawky et al the incidence of peripheral neuropathy is found to be 12.5%. In the study by Paul et al, he has reported the incidence of neurosensory as 78% and neuromotor as 16%.

Haematological toxicities included Anemia in 6 (7.69%) patients, Neutropenia in 15 (26.24%) patients and Thrombocytopenia in 2 (2.56%) patients only. Out of the 6 patients with Anemia 4 had Grade 2 and 2 patients had Grade 3. Out of the 15 patients with Neutropenia 8 patients had Grade 2 and 7 patients had Grade 3. All the 7 patients with grade 3 neutropenia required postponement of chemotherapy. Postponement of chemotherapy may affect the overall outcome of the treatment but was not studied in our study[19,20]. Thrombocytosis of Grade 2 was seen in 2 patients. In a recent study by Chen Yu Huang et al[21] with weekly paclicarbo chemotherapy he has a reported incidence of Anemia 22.7%. Thrombocytopenia 13.6% and Neutropenia 77.3%. The study by Shawky et al reported Grade 3 Anemia in 9.4%, Grade 3 Thrombocytopenia in 6.3%. Grade 3 and 4 neutropenia was seen in 25% and 3.1% respectively.

Alopecia was seen in all patients who received Paclitaxel Carboplatin chemotherapy and this was significant after the second chemotherapy. Most of the literatures have observed the same finding.

Nausea was another major symptom and was found in 48.72% of the study population. Out of this 35.90% patients had Grade 1, 11.54% had Grade 2 and only 1.28% had Grade 3 Nausea. In the study by Paul A et al he reported nausea Grade 1 in 7.62%, Grade 2 in 4.28% and Grade 3 in 0.93% of the study population who received Paclitaxel Carboplatin chemotherapy regimen[17,22]. In our study 7 patients who had nausea later had diarrhoea. Most of the patients who had nausea progressed to have vomiting. It was found to be Grade 0 in 32(41.03%) patients, Grade 1 in 20 (25.64%) patients, Grade 2 in 25 (32.05%) patients and Grade 3 in 1(1.28%) patient. In the study by Shawky et al, 9.4% patients had Grade 3 vomiting.

Other problems seen in the study population included Myalgia in 43.59% patients, Arthralgia 29.49%, Fatigue in 56.41% patients, Mucositis was seen in 20.51% patients and Diarrhoea in 8.97% patients. Grade 1 hypersensitivity developed in 1

patient but none of the patients had developed any severe allergic reaction.

Study Limitation- This study did not analyse the deterioration of overall prognosis due to postponement of chemotherapy due to neutropenia.

CONCLUSION

Surface epithelial cancer of Ovary mainly affects the middle aged women. The commonest histopathology is serous carcinoma and most of the patients present in an advanced stage of the disease. The most important non haematological toxicity is peripheral sensory and motor neuropathy. Sensory neuropathy is more than motor neuropathy. Neutropenia is the major haematological toxicity followed by Anemia and Thrombocytopenia. This chemotherapy was well tolerated by most of the patients. Neutropenia was the most important toxicity which resulted in postponement of chemotherapy. This may even affect the result of the chemotherapy treatment.

REFERENCES

1. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin*. 2018;68(6):394–424
2. Shabir S, Gill PK. Global scenario on ovarian cancer – Its dynamics, relative survival, treatment, and epidemiology. AUJMSR; 2019: 2(1); 17-25
3. Lima MA, Dos Santos L, Turri JA, Nonogaki S, Buim M, Lima JF, et al. Prognostic value of ADAMTS proteases and their substrates in epithelial ovarian cancer. Pathobiology. 2016;83:316-26
4. Shanmughapriya S, Senthilkumar G, Arun S, Das BC, Natarajaseenivasan K. Risk factors for epithelial ovarian carcinoma in India: A case control study in low-incidence population. Int J Cancer Res. 2016;12(1):61-68.
5. Consolidated Report of Population Based Cancer Registries 2001-2004. National Cancer Registry Program. Indian Council of Medical Research. Bangalore: 2006.
6. National Comprehensive Cancer Network. Ovarian Cancer Including Fallopian Tube Cancer and Primary Peritoneal Cancer. Version 4.2017
7. Barlin JN, Jelinic P, Olvera N, Bogomolniy F, Bisogna M, Dao F, et al. Validated gene targets associated with curatively treated advanced serous ovarian carcinoma. Gynecol Oncol 2013;128:512-7.
8. Pujade-Lauraine E, Wagner U, Aavall-Lundqvist E, Gebski V, Heywood M, Vasey PA, et al. Pegylated liposomal Doxorubicin and Carboplatin compared with Paclitaxel and Carboplatin for patients with platinum-sensitive ovarian cancer in late relapse. J Clin Oncol. 2010 Jul 10;28(20):3323-9.
9. Basu P, De P, Mandal S, Ray K, Biswas J. Study of 'patterns of care' of ovarian cancer patients in a specialized cancer institute in Kolkata, eastern India. Indian J Cancer. 2009 Jan-Mar;46(1):28-33.
10. Weiss RB. Hypersensitivity reactions. Semin Oncol. 1992;19(5):458–477
11. Weiss RB, Donehower RC, Wiernik PH, et al. Hypersensitivity reactions from Taxol. J Clin Oncol 1990;8(7):1263–1268
12. Franklin HR, Simonetti GP, Dubbelman AC, Bokkel Huinink WW, Taal BG, Wigbout G, et al. Toxicity grading systems: a comparison between the WHO scoring system and the common toxicity criteria when used for nausea and vomiting. Annals of Oncology 5: 113-117, 1994.
13. National Cancer Institute. Common toxicity criteria, version 2.0. Available from URL: http://ctep.cancer.gov/forms
14. Zhang X, Chen WW, Huang WJ. Chemotherapy-induced peripheral neuropathy. Biomed Rep. 2017 Mar;6(3):267-271. doi: 10.3892/br.2017.851. Epub 2017 Jan 27. PMID: 28451384; PMCID: PMC5403454.
15. Polomano RC, Bennett GJ. Chemotherapy-evoked painful peripheral neuropathy. Pain Med. 2001;2:8–14.
16. Hershman DL, Lacchetti C, Dworkin RH, Smith EM Lavoie, Bleeker J, Cavaletti G et al. Prevention and management of chemotherapy-induced peripheral

neuropathy in survivors of adult cancers: American Society of Clinical Oncology clinical practice guideline. J Clin Oncol. 2014;32(18):1941-1967.

17. Paul A Vasey, Gordon C Jayson, Alan Gordon, Hani Gabra, Rob Coleman, Ronnie Atkinson et al. Phase III Randomised Trial of Docetaxel-Carboplatin for Ovarian Carcinoma. Journal of the National Cancer Institute.2004;96(22):1682-1691
18. Shawky H, Tawfik H, Hewidy M. Weekly dose-dense paclitaxel and carboplatin in recurrent ovarian carcinoma: a phase II trial. J Egypt Natl Canc Inst 2014;26(3):139-45.
19. Ozols RF, Bundy BN, Greer BE, Fowler J, Clarke-Pearson D, Burger RA, et al. Phase III trial of carboplatin and paclitaxel compared with cisplatin and paclitaxel in patients with optimally resected stage III ovarian cancer: a Gynecologic Oncology Group Study. J Clin Oncol 2003; 21: 3194–200.
20. Vasey P, Atkinson R, Osborne R, Parkin D, Symonds P, Coleman R, et al. Carboplatin (Cb) followed sequentially by docetaxel (D) with or without gemcitabine (G) in ovarian, peritoneal and fallopian tube cancers: results of SCOTROC 2A. Proc ASCO 2003; 22: 449.
21. Chen-Yu Huang, Min Cheng, Na-RongLee. Comparing Paclitaxel–Carboplatin with Paclitaxel–Cisplatin as the Front-Line Chemotherapy for Patients with FIGO IIIC Serous-Type Tubo-Ovarian Cancer. Int. J. Environ. Res. Public Health 2020, 17(7), 2213
22. Hay JW. Quality of life effects of chemotherapy-induced neuropathy in ovarian cancer. Proc ASCO 2002; 21: 222a.

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A COMPARATIVE STUDY OF SPIROMETRIC PARAMETERS IN UNCOMPLICATED THIRD TRIMESTER OF PREGNANCY

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ABSTRACT

Introduction: Pregnancy is a state of profound changes in integrated physiological control systems of body. Approximately 60-75% of healthy pregnant women with no history of cardiac or pulmonary disease complain of breathlessness in daily activities by approximately the 30th week of gestation. Pulmonary function tests provide precise knowledge regarding the respiratory indices that allows the clinician to verify the extent of adaptation in pregnant women and thus helps to avoid unnecessary treatment of physiological changes misinterpreted as pathological changes in reference to pre-pregnancy standards.

Material and Methods: The study included a total of 100 third trimester pregnant females of uncomplicated pregnancy were divided into two groups (Group A and Group B, each having 50 subjects). Their percent predicted values of FVC, FEV_1 and FEV_1/FVC ratio were compared with control (Group C-50 subjects) using Helios-401 spirometer. The percent predicted values were compared and p value less than 0.05 was considered significant.

Results: Both of the Groups A and B (pregnant subject group) had significant less values of FVC, FEV_1 and FEV_1/FVC ratio in comparison to Group C (non-pregnant group). This study validates the physiological changes, adaptations and decline in pulmonary function in pregnancy especially in the last trimester. The effect of mechanical factors like the enlarged uterus displacing the diaphragm upwards as well as hormonal influences also may play a role, in altering and compromising the pulmonary flow parameters.

Conclusion: Continuous monitoring of pulmonary function tests during routine antenatal care may prove to be of great value in maternal healthcare as cases of restriction and obstruction in lungs during pregnancy can be identified early and its deterioration can be prevented by proper management.

Key words: Pregnancy, spirometry, antenatal care, maternal healthcare

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INTRODUCTION:

Giving birth to a child is a very precious event in the life of every woman. It is a time of celebrations in the family to welcome a new member. Pregnancy is characterized by profound changes in the function of several integrated physiological control systems (i.e., respiratory, cardiovascular, metabolic, renal, thermoregulatory) both at rest and during exercise.[1,2,3,4] During pregnancy, to accommodate the enlarging uterus the ribcage undergoes structural changes, the diaphragm elevates about 4 cm and the circumference of the lower rib-cage increases about 5 cm in response to hormonal changes.[5] But still , breathlessness is reported during activities of daily life (e.g., stair climbing) by as many as 60-75% of healthy pregnant women with no history of cardiac or pulmonary disease by approximately the 30th week of gestation.[6] Therefore, acquisition of new information on the interactive effects of different stages of pregnancy and pulmonary function is required. Pulmonary function tests provide precise knowledge regarding the respiratory indices that allows the clinician to verify the extent of adaptation in pregnant women and thus helps to

avoid unnecessary treatment of physiological changes misinterpreted as pathological changes in reference to pre-pregnancy standards.[7] Few studies reported that forced vital capacity was low in the 3rd trimester pregnant group than non-pregnant women.[8,9] In contrast, Studies also found that vital capacity tend to increase in the later stages of pregnancy[10,11] or no change significantly throughout the course of pregnancy.[1,5] In light of the contradictory evidences given by different studies, the present study was conducted to find out the changes in pulmonary function tests during third trimester of uncomplicated pregnancy and adaptive changes in respiratory physiology.

MATERIALS & METHODS:

The cross-sectional study was carried out in the Department of Physiology in collaboration with the Department of Obstetrics and Gynaecology in Rohilkhand Medical College & Hospital, Bareilly after approval of institutional ethical committee. The study was conducted on 100 female subjects in 3rd trimester of pregnancy free from any complication and systemic diseases within the age of 19-30 years irrespective of gravida. They were selected randomly from attending antenatal clinic of the hospital and which is divided as per gestational age into two groups with gestation age of ≤ 29wks-34wks as Group A (n=50) and with gestation age of ≤ 35wks-40wks as Group B (n=50) and 50 non-pregnant women is Group C as control. The age matched 50 controls (Group C) were volunteers from the relatives of pregnant women who were attending the OPD and from amongst hospital staff from same socio-economic group according to Modified Prasad's social classification criteria for socioeconomic status.[12] Those with known respiratory or cardiovascular diseases, anaemia, multiple pregnancy, hydramnios or on therapy for any other ailments were excluded from the study. Those subject who are doing regularly exercise or yoga were also excluded from the study. Pulmonary function test (spirometry) was done by HELIOS 401 in standing position and American Thoracic Society (ATS) criteria was adhered.[13] The FVC, FEV_1 and FEV_1/FVC ratio were recorded and their percent predicted values were compared. SPSS version 17 was used for statistical analysis and p value less than 0.05 was considered significant.

RESULTS:

The numerical values of the various anthropometric parameters and particular spirometry test parameters are given in the table 1 and 2 respectively. allowing comparison between the best pre- and post-medication maneuvers. Table 1 shows that there was no statistically significant difference of mean age of subjects of the three groups. (Group A-24.14 yrs, Group B- 24.86 yrs and Group C- 24.02 yrs). The difference in weight and BMI were statistically significant between group A and group C subjects, group B and group C subjects and group A and group B subjects. Table 2 shows that the percentage predicted value of Forced vital capacity (FVC), forced expiratory volume in 1 sec (FEV_1), FEV_1/ FVC (%) of Group A ,B and C. The value of FVC is found to be less in the pregnant females as compared to their non-pregnant counterpart. There is also a gradual decline in the values of FVC as period of gestation increases. The difference between Group A and Group C subject was significant (p-value: 0.044). The difference between Group B and Group C subject was significant (p-value: 0.014). The percentage predicted value of forced expiratory volume in 1 sec (L) there is a gradual decline in the values of FEV_1 as period of gestation increases. Also the value of FEV_1 is less in the pregnant females as compared to the non-pregnant controls. The difference between Group A and Group C subject was highly significant (p-value: 0.0001). The difference between Group B and Group C subject was highly significant (p-value: 0.001). The percentage predicted value of FEV_1/ FVC (%) ratio is found to increase as period of gestation increases. Also the value of FEV_1/ FVC (%) is less in the pregnant females as compared to the non-pregnant controls. The difference between Group A and Group C subject was significant (p-value: 0.046). The difference between Group B and Group C subject was significant (p-value: 0.041).

Table 1: Comparison of Anthropometric Parameters of different groups

Anthropometric Parameters	Group A (n=50)	Group C (n=50)	*p*-Value	Group B (n=50)	Group C (n=50)	*p*-Value
	Mean± SD	Mean± SD		Mean ± SD	Mean± SD	
Age	24.14± 3.60	24.02± 3.29	.861	24.86± 3.41	24.02± 3.29	.275
Height	150.68 ± 4.24	153.82 ± 3.32	.000	151.6± 4.90	153.82 ± 3.32	.011
Weight	56.90± 7.97	48.44± 6.05	.000	64.26± 9.99	48.44± 6.05	.000
BMI	25.05± 3.30	20.45± 2.24	.000	27.89± 3.65	20.45± 2.24	.000

Table 2: Comparison of percentage predicted value, Forced vital capacity (L), Forced expiratory volume in 1 sec (L), FEV_1/ FVC(%) of different Groups (n=50).

Parameters	Group A	Group C	Group B	Group C
FVC(L)	90.58±13.42	96.66±14.97	89.34±15.8	96.66±14.97
t-value	-2.065		-2.547	
p-value	0.044*		0.014*	
FEV_1	94.46±19.13	107.34±20.87	93.50±18.14	107.34±20.87
t-value	-3.856		-3.583	
p-value	<0.0001*		0.001*	
FEV_1/FVC	105.30±18.10	112.16±16.80	107.08±17.48	112.16±16.80
t-value	-2.047		-1.425	
p-value	0.046*		0.041*	

*p-value<0.05 considered as significant

DISCUSSION:

The difference in weight and BMI were statistically significant between group A and group C subjects, group B and group C subjects and group A and group B subjects in our study. This is because of the normal weight gain, edema and uterine enlargement which occur in pregnancy. This gain in weight may be one of the reasons for the changes in pulmonary function test.

In this study, FVC, FEV_1 and FEV_1/ FVC were found to be significantly less in pregnant subjects (Group A and Group B) in comparison to control (Group C). This validates the physiological changes and decline in pulmonary function in pregnancy especially in the last trimester.

In our study, the percentage predicted value of FVC were found to be within normal limits and a reduction in percentage predicted values of FVC is seen in the pregnant females (Group A & Group B) as compared to their non-pregnant counterpart(Group C). A few studies like those done by Mokkapatti R et al [9] Puranik BM et al [14] and Monga U et al[15] Neeraj et al [16] Phatak et al [17]and Harirah et al[18] also show reduction in FVC. The decrease in FVC is attributable to the mechanical pressure of enlarging gravid uterus, elevating the diaphragm & restricting the movements of lungs thus hampering the forceful expiration.[7] In contrast, studies done by Grindheim et al[19] and Milne et al[6] show significant rise in FVC. There is also a gradual decline in the values of FVC as period of gestation advances in this study but that was not significant (p-value: 0.683). Sunyal DK et al [20] showed reduced FVC in all trimesters as compared to control with maximum decrease in third trimester but in contrary Deepal S et al [21] found no significant changes in FVC during all trimesters of pregnancy as according to them hormonal alteration in pregnancy causes a reduction in the tracheo-bronchial smooth muscle tone and the increasing thoracic width causes no impairment in large airway function throughout pregnancy.

FEV_1 is essential to assess ventilatory capacity of the lungs or to assess the ability to ventilate.[22] In this study, the value of FEV_1 is also less in the pregnant females as compared to the non-pregnant controls. Studies by Puranik et al [14], Monga et al [15], Phatak et al [17], Pandya MR et al [23]and Gupta L et al [24] also showed decrease in FEV_1. Decline in FEV_1 as seen in our study is could also be due to bronchoconstrictor effect of decreased alveolar PCO_2 (caused by hyperventilation) on the bronchial smooth muscles.[10] But, studies done by Milne et al[6] and Mokkapati et al[9] shows no change in FEV_1 during pregnancy.

FEV_1/ FVC(%) is found to increase as period of gestation increases in this study . Also the value of FEV_1/ FVC(%) is less in the pregnant females as compared to the non-pregnant controls. This finding correlates with Patil HJ et al [25], Salman H et al [26] and Neeraj et al [27] where the FEV_1/FVC ratio was found to increase as period of gestation increases. The ratio was found to increase because FVC decreases more than FEV_1.

CONCLUSION:

The present study highlights observation that the respiratory parameters are significantly reduced due to gravid state in the last trimester of pregnant women. All parameters recorded in percent predicted values were found to be normal (>85% of predicted). This indeed justifies the fact that variation of lung function even during third trimester of pregnancy is physiological not pathological. Extensive studies on larger population

need to be done to standardize norms on predicted and desired PFT values in various phases of pregnancy. This will help to differentiate normal deviation of PFT in gravid state from that of non gravid states and provide accurate information of the respiratory status of the patient to the clinicians, obstetricians and anaesthetists for managing complications especially in the last trimester of pregnancy. In India, continuous monitoring of pulmonary function tests in routine antenatal care may prove to be of great value in maternal healthcare as cases of restriction and obstruction in lungs during pregnancy can be identified early and its deterioration can also be prevented by proper management.

REFERENCES:

1. Deshpande H, Madkar C, Dahiya P. A study of pulmonary function tests in different stages of pregnancy. Int J Biol Med Res.2013;4(1):2713-1716
2. Weinberger SE, Weiss ST, Cohen WR, Weiss JW, Johnson TS. Pregnancy and the lung. Am Rev Respir Dis.1980; 121: 559-581.
3. Lotgering FK, Gilbert RD, Longo LD. Maternal and fetal responses to exercise during pregnancy. Physiol Rev.1985; 65: 1-36.
4. Wise RA, Polito AJ, Krishnan V. Respiratory physiologic changes in pregnancy. Immunology Allergy Clin North Am. 2006; 26: 1-12
5. Gilroy RJ, Mangura BT, Lavietes MH. Rib cage and abdominal volume displacements during breathing in pregnancy. Am Rev Respir Dis 1988;137:668–72.
6. Milne JA, Howie AD, Pack AI. Dyspnoea during normal pregnancy. Br J Obstet Gynecol.1978; 85: 260-263.
7. Shaikh RM, Deshpande DR, Ganeriwal SK, Reddy BV. Effect of pregnancy on vital capacity and FEV1. J Obs Gyn of India; 1983:33: 495 – 499.
8. Jayawardene J. The effects of pregnancy upon pulmonary function in normal pregnant women at term. Journal of Sri Lanka college of Obstetricians and Gynaecologists;1994:16:21-25
9. Mokkapatti R, Prasad EC, Venkatraman, Fatima K; Ventilatory functions in pregnancy. Indian J Physiol Pharmacol. 1991; 35(4): 237-240
10. Chhabra S, Nangia V, Ingley KN, Changes in respiratory function tests during pregnancy; Indian Journal of Physiology and Pharmacology. 1982;32:56-60.
11. Puranik BM, Kurhade GA, Kaore SB, Patwardhan SA, Kher JR. PEFR in pregnancy: A longitudinal study. Indian journal of Physiology and Pharmacology 1992; 39(2):137-43.
12. Prasad BG. Social Classification of Indian families. J Indian Med Assoc 1961;37:250-51.
13. American Thoracic Society. Standardization of spirometry, 1994 update. Am J Respir Crit Care Med 1995; 152: 1107–1136.
14. Puranik BM, Kaore SB, Kurhade GA, Agrawal SD, Patwardhan SA, Kher JR. A longitudinal study of pulmonary function tests during pregnancy. Indian J Physiol Pharmacol. 1994;38(2):129-32.
15. Monga U, Kumari K; Pulmonary functions in Punjabi pregnant women. Indian J Physiol Pharmacol 2000; 44 (1): 115-116.
16. Neeraj, Sodhi C, Pramod J, Singh J, Kaur V. Effect of advanced uncomplicated pregnancy on pulmonary function parameters of North Indian subjects. Indian J Physiol Pharmacol. 2010;54(1):69-72
17. Phatak MS, Kurhade GA. A Longitudinal Study of Antenatal Changes in Lung Function Tests and Importance of Post Parted Exercise in their Recovery. Indian J. Physiol, Pharmacol.2003; 47(3):352-56.
18. Harirah HM, Donia SE, Narsallah FK, Saade GR, Belfort MA. Effect of gestational age and position on lung function: A longitudinal study. Obst Gynecol.2005; 105: 372-76.
19. Grindheim G, Toska K, Estensen ME, Rosseland LA. Changes in pulmonary function during pregnancy: a longitudinal cohort study. 2012 Jan; 19(1):94-101.
20. Sunyal DK, Amin MR, Ahmed A, Begum S, Begum M. Pulmonay function test in Pregnant Women. J Bangladesh Soc Physiol. 2007 Dec;(2): 20-23
21. Deepal S. Weerasekara, D. Kusuma Ruberu, Sivayogan S. Pulmonary functions in pregnant Sri-Lankan women. Sabaragamuwa University Journal.2011; Vol 2, (1)57-60.
22. Cotes JE. Lung Function assessment and application in medicine, 3rd Edi. Oxford : Black well scientific publications ; 1975 : 93-105.

23. Pandya MR, Nishith SD, Bhatt RV. Pulmonary function in pregnancy.J.Obst. and Gynaec. 1972;22(1):1-3
24. Gupta L, Dixit R. A linear study of pulmonary function tests in normal pregnant and non-pregnant women. Journal of the Indian Medical Association. 2013;11(10):666-9.
25. Patil HJ, Deokar NA. Effect of advanced normal pregnancy on pulmonary function tests. International Journal of Anatomy Physiology and Biochemistry. 2015; 2(1):12-15.
26. Salman H. Al-Nuamii, Physiological Changes In Spirometric Parameters During Pregnancy In Iraqi Women; J Fac Med Baghdad. 2012;54(4): 36-39.
27. Neeraj, Sodhi C, Pramod J, Singh J, Kaur V. Effect of advanced uncomplicated pregnancy on pulmonary function parameters of North Indian subjects. Indian J Physiol Pharmacol. 2010;54(1):69-72

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TRUNK MUSCLE ACTIVATION AT HANDS JUST ABOVE THE HEAD IN NORMAL INDIVIDUALS: AN OBSERVATIONAL STUDY

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ABSTRACT

Introduction: Body posture is formed by assembling a set of segments and for execution of voluntary movement task must be coordinated and performed simultaneously. This study aims to measure the trunk muscle activation at hands just above the head in normal individuals and compare it between the males and females.

Material and Methods: It is an observational study conducted in tertiary care hospital at Ahmednagar. Normal individuals who were willing to participate, aged 18-60 years and not having any neurological condition and musculoskeletal condition were included. A task of taking hands on the top of the head was given in which RMS value of 6 trunk muscles was recorded at hands just above the head position. These 6 muscles are upper trapezius (TP), erector spinae (ES) at T3, T9 and L3 level, serratus anterior (SA), latissimus dorsi (LD), pectoralis major (PM) and oblique abdominals (OA). Muscle activation was measured by RMS (µV) by using surface EMG as an outcome measure. Non parametric test was used for gender comparison.

Results: The highest activation was seen in the TP (mean RMS- 10.57µV) on the non-dominant side of the participants. Lowest activation was seen in the ES-T3 (mean RMS-3.65µV) on the dominant side. When the comparison between males and females was done on the dominant side, activation of 4 muscles were more in females and 4 muscles were having more activation in males. In comparison of males and females on non-dominant side, all muscles were more activated in males compare to the females except OA.

Conclusion: Highest activated muscle during the given task was TP. There was no statistically significant difference seen in the activation pattern of males and females when compared on dominant as well as non-dominant side.

Key words: Normal individuals, SEMG, Muscle activation, RMS

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INTRODUCTION

A set of assembled segments build up the body posture, each with its own mass, that we are linked together by flexible joints controlled by neuromuscular system. The central organization of posture involves interactions between external forces, such as gravity, the mechanical properties of the body and the neuromuscular forces.[1] There are two main functions of postural control system; first is to build up posture against gravity and ensure the balance is maintained and the second to fix the orientation and position of segments that serve as reference frame for perception and action.[1,2]

During execution of the voluntary movements, many aspects of the same task are coordinated and performed simultaneously. Coordination between posture and limb movement is another example seen in daily life. Often, two goals must be achieved at same time. There is need for an accurate performance of a goal directed movement on the one hand, and the maintenance of equilibrium and an appropriate posture, or set of postures.[3]

Most of published joint ROM data were obtained using a one-dimensional goniometric technique. This measuring technique necessarily imposes a static posture, which the subject has to maintain during the time of measurement. However, in reach capability analysis, dynamic reach posture is of most interest.[4] Kim K and colleagues conducted a study on arm motion analysis in normal as well as stroke patients, where 12 simple ADLs were selected and averaged shoulder flexion-extension was found 68.24% of normal ROM while abduction-adduction was found 10.97% of normal ROM, which was less than the stroke patients.[5]

Muscle recruitment and coordination are commonly impaired in the neurological conditions where they impact negatively impact the function. Electromyography (EMG) recordings provide a window into central nervous system to evaluate recruitment and coordination. Surface EMG signals can be monitored from many key upper extremity muscles during the dynamic task.[6]There are several studies done to see the postural control and muscle activation in the normal individuals using EMG during dynamic tasks. A study was done by Kaur M. and colleagues in healthy males on EMG analysis for identifying walking patterns, where they used RMS; a recommended method to assess level of muscle activity and found hamstring and solus act as agonist and are more active during gait cycle.[7]

Most of the previous studies are done either on one gender or on the dominant side during a specific task and such studies of muscle activation in normal individuals were done on the complex task like walking and running but simple tasks of daily living were not focused. Muscle activation in such simple tasks can be compared with the impaired person's ability to activate the trunk muscles during such simple tasks. Male and female comparison in the trunk muscle activation is not done recently in the normal individuals, so there is need to conduct a study to compare the trunk muscle activation during a specific task between males and females, so that the understanding of the results can later be applied to the population with neurological dysfunction affecting trunk or upper extremity. Therefore, this study was undertaken to find the pattern of trunk muscles activation in normal individuals just before hands touching the head. The study objectives were: 1) To find which trunk muscle get more activate just before hands touch the head, 2) To find the difference in dominant and non-dominant side muscle activation in the normal individuals at just before hands touching the head and 3) To compare the trunk muscle activity between males and females during the task of hands taking on top of the head.

MATERIAL AND METHODS

Study design: Observational Study

Study population: Normal individuals who were working in and around the hospital were informed about the study. Participation was based on the personal commitment of the participant.

Study area: VMH-a tertiary care hospital, Ahmednagar

Study duration: 6 months

Sample size: 23

Inclusion criteria: Age between 18-60 years

Exclusion criteria: Person with any musculoskeletal or neurological disorder. One who is not willing to participate.

Ethical approval: Ethical approval was obtained from the Institutional Ethical Committee, Ahmednagar, India.

Prior to participation, the study protocol was explained verbally and written consent was obtained from the participants. Only two therapists were in contact with the participants. Care for the privacy of the participants were taken properly. Demographic data of the participants along with medical history was documented and these records were stored in secure area with limited access. Anonymity and confidential input of data were guaranteed to protect their personal information. Encoded data were entered in an encrypted electronic database.

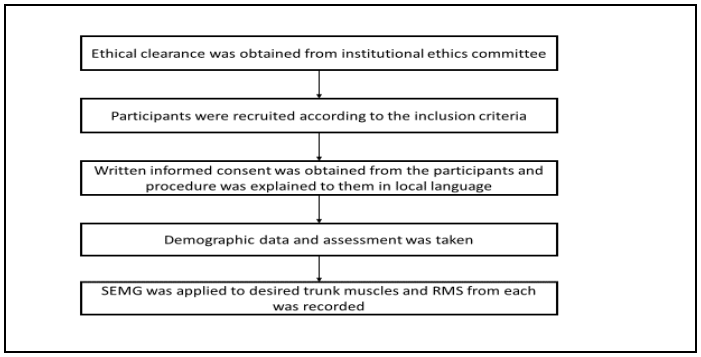

Figure 1: Recruitment of participants

Outcome measures

Participants were assessed first for the sitting balance. Seat depth and footrest were adjusted according to anthropometrical measures of the person sitting in the chair. Hip-knee should come in 90^{o} flexion. The skin of trunk was cleaned with the sterellium and excess hairs were removed if necessary. Surface EMG was used to record the muscle activity. Electrode placement was done in the direction of the muscle fibers.[8] Ag-AgCl electrodes were used to record the EMG signals. those are- Erector spinae (ES) at T3, T9 and L3 level, Latissimus dorsi (LD), the ascending part of the trapezius (TP), serratus anterior (SA), cranial section of sternocostal head of pectoralis major (PM), and the oblique abdominal muscle (OA). Electrode placement is described in details in Table 1 [9] and shown in figure no.2. Participants were asked to perform the task of taking hands on top of the head and warned to stop at a point just 2 cm above vertex of the head and at that point EMG data was recorded. 3 trails of same task were taken and mean of 3 was documented in electronic data.

Table 1: Electrode placement of trunk muscles

Muscles	Placement
Erector spinae (ES)	Approximately 2 cm lateral from the spine over the muscle belly
Latissimus dorsi (LD)	Approximately 4 cm below the inferior tip of scapula, half the distance between the spine and lateral edge of the torso.
Trapezius (TP)	Along the ridge of shoulder, slightly lateral to and one half the distance between the cervical spine at C7 and the acromion
Serratus anterior (SA)	Horizontally just below the axillary area, at the level of the inferior tip of the scapula
Pectoralis major (PM)	Parallel to the muscle fibres, below the clavicle and above the beast and nipple
Oblique abdominal (OA)	Lateral to the rectus abdominis and directly above the ASIS, halfway between crest and the ribs at a slightly oblique angle

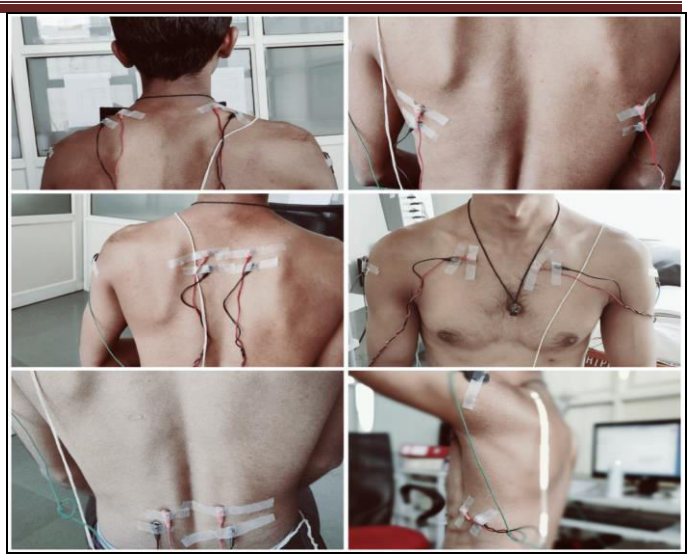

Figure 2: Electrode placement on the subject, from left to right 1) Upper trapezius (TP) 2) Erector spinae at T3 level (ES-T3) 3) Erector spinae at L3 level (Es-L3) 4) Latissimus dorsi (LD) 5) Pectoralis major (PM) 6) Serratus anterior (SA)

Data analysis

Statistical analysis was done using descriptive statistics i.e., mean and standard deviation of RMS value. Microsoft excel and Graph pad were used for the data analysis. Normality of data was checked and according to that the data was analyzed with the statistical test. Comparison between males and females was done using non parametric test i.e., Wilcoxon signed rank test on dominant as well as non-dominant side.

RESULTS

In the present study, 23 participants were recruited with their voluntary consent out of which 14 were males and 9 were females. Age group which was considered was the 18-60 years. The demographic details of the participants are shown in Table 2.

Table 2: Description of demographic data of participants

Characteristics	
Age (years)	34.95 ± 9.79
Gender (M: F)	14:9
Dominant side (R: L)	22:1
Height (cm)	164.52 ± 6.13
Weight (kg)	58.26 ± 7.12

Table 3 represents the mean and SD of RMS value recorded just before hands touching the head from both the sides.

Figure no.3 represents the mean RMS (µV) of trunk muscles of dominant and non-dominant side in the normal individuals. Most activated muscles were TP followed by PM and ES-T3. On right side the most activated muscle was TP followed by ES-T3 while on the left side most activated muscle was TP followed by PM. In majority of muscles activation is more on the non-dominant side except ES-T3 and LD.

Table 3: Description of mean RMS (µV) of both sides just before hands touching the head

Muscles	RMS (µV)	
	Right	Left
TP	8.87 ± 4.89	10.57 ± 5.29
ES-T3	8.91 ± 6.61	7.22 ± 4.31
ES-T9	5.22 ± 1.31	5.22 ± 1.48
ES-L3	3.65 ± 1.34	4.00 ± 1.28
OA	4.35 ± 2.33	5.13 ± 2.53
LD	4.87 ± 1.71	4.61 ± 2.04
SA	5.57 ± 3.19	6.13 ± 2.91
PM	7.30 ± 4.44	9.13 ± 7.82

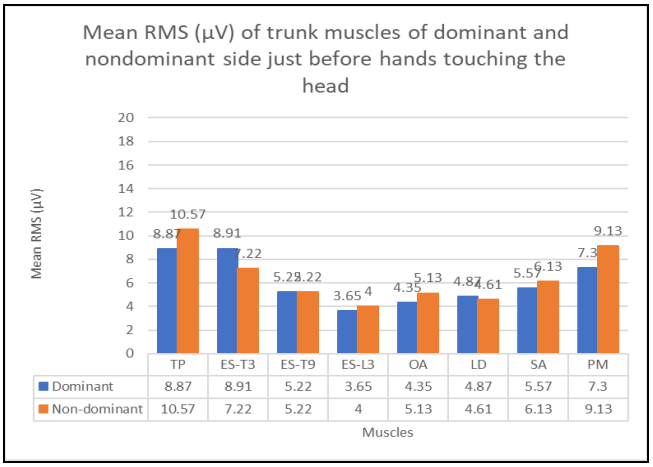

Figure 3: Depiction of mean RMS (µV) of trunk muscles of dominant and non-dominant side at just before hands touching the head

Table 4 and Fig 4 represents the comparison between males and females on the dominant side of the individuals. Comparison of data which passed normality i.e., TP, ES-L3 and LD was done using 'paired t' test which rest of the data which didn't passed normality was compared using Wilcoxon sign rank test where no significant difference was seen in both the genders in any muscle.

Table 4: Comparison of muscle activation of dominant side between males and females

Muscle	Male (n=14)	Female (n=9)	p value
TP	8.87 ± 4.89	9.17 ± 5.34	0.9729
ES-T3	8.91 ± 6.61	7.75 ± 5.88	0.1953
ES-T9	5.22 ± 1.31	5.33 ± 1.30	0.9375
ES-L3	3.65 ± 1.34	3.92 ± 1.62	0.7914
OA	4.35 ±2.33	4.92 ± 2.54	0.0547
LD	4.87 ± 1.71	4.67 ± 1.72	0.2228
SA	5.57 ± 3.19	5.08 ± 2.71	0.2188
PM	7.30 ±4.44	5.83 ± 3.54	0.0742

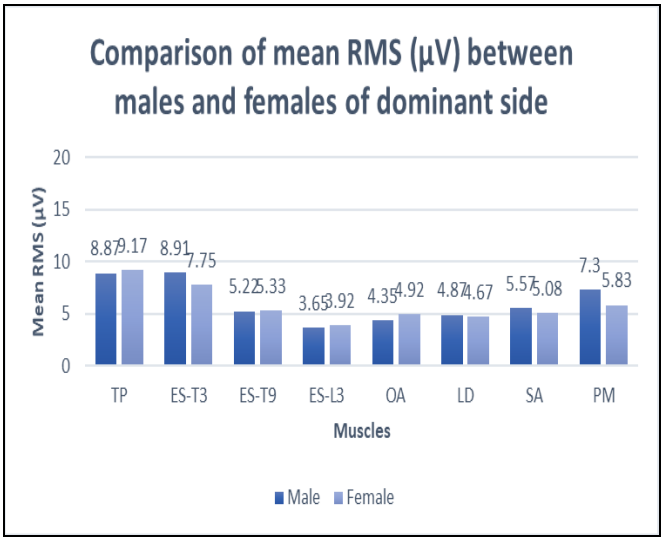

Figure 4: Comparison of mean RMS (µV) of dominant side between males and females

Table 5 and Fig 5 represents the comparison between the males and females on the non dominant side muscles. For ES-T3 and SA paired t test was used for the comparison. For rest of the muscles Wilcoxon signed rank test was applied for the comparison. No statistically significant difference was seen in both genders in any muscle. Slightly more activation was seen in males compared to the females in all muscles except OA.

Table 5: Comparison of muscle activation of non-dominant side between males and females

Muscle	Male (n=14)	Female(n=9)	p value
TP	10.47 ± 5.29	10.50 ± 5.39	0.5781
ES-T3	7.22 ± 4.31	6.25 ± 3.47	0.2347
ES-T9	5.22 ± 1.48	4.83 ± 1.47	0.1289
ES-L3	4.00 ± 1.28	3.92 ± 1.00	0.1094
OA	5.13 ± 2.53	5.42 ± 2.54	0.1094
LD	4.61 ± 2.04	4.42 ± 1.88	0.2188
SA	6.13 ± 2.91	5.58 ± 2.43	0.1592
PM	9.13 ± 7.82	7.17 ± 6.22	0.4258

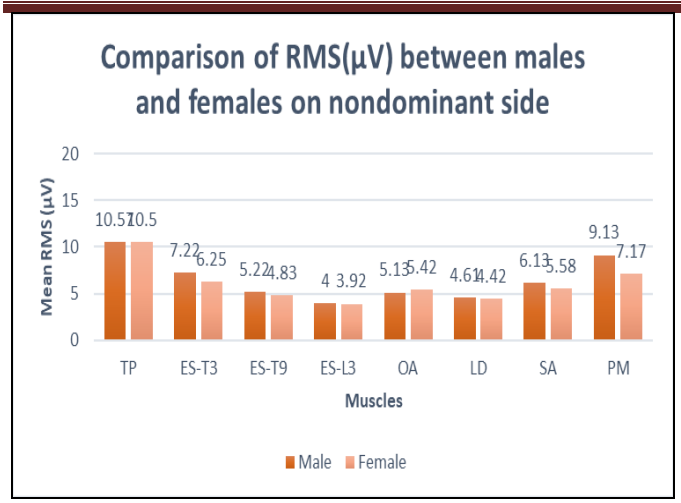

Figure 5: Comparison of mean RMS (µV) of trunk muscles of dominant side between males and females

DISCUSSION

The present study aims to find the pattern of trunk muscle activation in the normal individuals just before hands touching the head. The hands touching the top of head activity includes the shoulder abduction along with elbow flexion and wrist flexion. The functional range of these joints are; for shoulder abduction around 124°, elbow flexion around 125° [10] and wrist flexion approximately 38°.[11] Majority of the participants had the right side dominant. Male participants (n=14) were more compare to the female participants (n=9).

Muscle activation on dominant and nondominant side

When muscle activation of the dominant and nondominant side was seen, more activation was present on the nondominant side in muscles like Trapezius (TP), erector spinae at T9 level (ES-T9), erector spinae at L3 level (ES-L3), oblique abdominal (OA), serratus anterior (SA), pectoralis major (PM). Only 2 muscles have shown more activation on the dominant side, these are, erector spinae at T3 level (ES-T3) and latissimus dorsi (LD). From all these muscles, major difference was seen in only 3 muscles i.e., TP, ES-T3 and PM, but no statistically significant difference was seen in the activation was present.

Comparison between males and females on the dominant side muscle activation

When the comparison between males and females was done on the dominant side, no statistically significant difference was seen on either of the gender. But activation of specific muscles like ES-T3, PM, SA were slightly more in males compare to the females. Kasahara S. and colleagues conducted a study on comparison of trunk muscle strength specifically Abdominal muscles with SEMG, they found that activation of muscles was more in the females compare to the males.[12] Also another study conducted by Szucs K.A. and Borstad J.D. have mentioned that Activation of trapezius muscle is more in the females compare to the males mainly in the upper fibres only transverse fibres show different pattern of activation.[13]

Comparison between males and females on nondominant side muscle activation

When the comparison between male sand females was performed on the nondominant side, no statistically significant difference was seen in any of the muscle, but among all the muscles, PM has shown slightly more difference showing more activation in the males than the females. There are several studies done in normal individuals where the muscle activation with the help of EMG was compared between the dominant and non-dominant side of the person during different tasks like throwing, lifting, bending activities. Recently Buschbeck J. conducted a study to see muscle activation in throwing with dominant and nondominant arm where activation of different fibres of deltoid was seen but no significant difference in the activation was seen during the throwing between bilateral side.[14] Another study was performed by the Jee H. in which he has mentioned that in middle range of abduction-adduction activity of shoulder the activation on nondominant side was more but the initial and end range showed more activation on the dominant side.[15]

The present study focuses on the activation of majority of the trunk muscles which was not seen in the previous studies in normal individuals. Mainly such studies are done in the patients with neurological conditions like stroke or spinal cord injury.

The main limitation study could have done with more sample size. Very simple task is included to see the muscle activation so more complex tasks can be included and along with the muscle recruitment the displacement of COG during the

hand movement can be studied simultaneously for more accurate kinematic analysis in posture. Further studies can be done by performed overcoming the limitations and findings of current study can be useful for the comparison between the normal individuals and patients with neurological condition.

Most important clinical implication of the study is that it helps to find the trunk muscle activation pattern during shoulder activity in normal individuals and these findings can be used to compare with the individuals with neurological impairments like peripheral nerve injury, spinal cord injury etc.

The study concludes that in normal individuals, there is no significant difference in the muscle activation between dominant and nondominant side. Also, the females have more activation of oblique abdominal in dominant as well as nondominant side where as other trunk muscles specially around shoulder muscles show more activation in males compare to the females.

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REFERENCES

1. Massion J. Postural control system. *Curr Opin Neurobiol*. 1994;4(6):877-887. doi:10.1016/0959-4388(94)90137-6
2. Massion J. Movement, posture and equilibrium: interaction and coordination. *Prog Neurobiol*. 1992;38(1):35-56. doi:10.1016/0301-0082(92)90034-c
3. Massion J, Alexandrov A, Frolov A. Why and how are posture and movement coordinated?. *Prog Brain Res*. 2004;143:13-27. doi:10.1016/S0079-6123(03)43002-1
4. Doriot N, Wang X. Effects of age and gender on maximum voluntary range of motion of the upper body joints. *Ergonomics*. 2006;49(3):269-281. doi:10.1080/00140130500489873
5. Kim K, Park DS, Ko BW, et al. Arm motion analysis of stroke patients in activities of daily living tasks: a preliminary study. *Annu Int Conf IEEE Eng Med Biol Soc*. 2011;2011:1287-1291. doi:10.1109/IEMBS.2011.6090303
6. Peters KM, Kelly VE, Chang T, Weismann MC, Westcott McCoy S, Steele KM. Muscle recruitment and coordination during upper-extremity functional tests. *J Electromyogr Kinesiol*. 2018;38:143-150. doi:10.1016/j.jelekin.2017.12.002
7. Kaur M., Mathur S., Bhatia D., Varma S. EMG analysis for identifying walking pattern in healthy males. 2015. 10.1109/PRIME.2015.7251335.
8. Potten YJ, Seelen HA, Drukker J, Reulen JP, Drost MR. Postural muscle responses in the spinal cord injured persons during forward reaching. *Ergonomics*. 1999;42(9):1200-1215. doi:10.1080/001401399185081
9. Crisswell E. CRAM's Introduction to Surface Electromyography. (2nd ed.). Canada: Jones and Barlett publishers; 2011.
10. Oosterwijk AM, Nieuwenhuis MK, van der Schans CP, Mouton LJ. Shoulder and elbow range of motion for the performance of activities of daily living: A systematic review. *Physiother Theory Pract*. 2018;34(7):505-528. doi:10.1080/09593985.2017.1422206
11. Gates DH, Walters LS, Cowley J, Wilken JM, Resnik L. Range of Motion Requirements for Upper-Limb Activities of Daily Living. *Am J Occup Ther*. 2016;70(1):7001350010p1-7001350010p10. doi:10.5014/ajot.2016.015487
12. Kasahara S., Samukawa M., Ishgaki T., Torii Y. Gender differences in the Curl-up and the double leg-lower test. J. Phys. Ther. Sci. 2011;23:463-467
13. Szucs KA, Borstad JD Gender differences between muscle activation and onset timing of the four subdivisions of trapezius during humerothoracic elevation. Human movement science 2013;32(6):1288-1298.
14. Kuhtz-Buschbeck J.P., Keller P. Muscle activity in throwing with the dominant and

non-dominant arm. Cogent Medicine 2019; 6:1

15. Jee H, Park J. Comparative Analyses of the Dominant and Non-Dominant Upper Limbs during the Abduction and Adduction Motions. *Iran J Public Health*. 2019;48(10):1768-1776

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TOXOPLASMA GONDII IgG PROFILE IN PATIENTS WITH BAD OBSTETRIC HISTORY ATTENDING INTEGRAL INSTITUTE OF MEDICAL SCIENCES AND RESEARCH, LUCKNOW - A PROSPECTIVE STUDY

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ABSTRACT

Background- Toxoplasmosis, caused by *Toxoplasma gondii*, is an emerging common parasitic disease in women of child-bearing age which can lead to several clinical manifestations such as still-births, congenital malformations, intra-uterine growth retardation and abortions. These manifestations can precipitate in mother as well as new born child propagating to severe morbidity and mortality. The aim of this study is to evaluate the serological profile of *Toxoplasma gondii* IgG antibodies in female patients having bad obstetric history.

Material & Methods- The study was carried out in the department of OBG, Integral Institute of Medical Sciences, Lucknow for a period of 6 months. The suspected patients having Bad Obstetric history (BOH) were subjected to a detailed questionnaire followed by serological investigation i.e ELISA for detection of IgG antibodies in the blood.Chi-square test was used to compare significance of difference between two proportions.

Results- Out of 85 cases enrolled, 16 cases were seropositive for Toxoplasma IgG antibodies indicating chronic infection whereas 69 cases were seronegative. The prevalence was reported to be 18.8% in this study. 68.7% of pregnant females were seropositive for Toxoplasma IgG antibodies where major cases were of 2nd (50%) and 1st (31%) trimester.

Conclusion- It is evident from this study that maternal infection of toxoplasmosis leads to pregnancy wastage in patients with BOH.

Keywords- Toxoplasmosis, *Toxoplasma gondii*, Bad obstetric history, ELISA, Congenital malformation,

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INTRODUCTION

Bad obstetric history (BOH) implicit previously foregoing unfavourable two or more consecutive foetal spontaneous abortions, stillbirths, history of intrauterine growth retardation, early neonatal deaths which accompanies a wide range of diseases including one of the major cause of congenital malformations, known as Toxoplasmosis[1].The infections acquired during gestation period or during the birth process leads to foetal and neonatal mortality. Toxoplasma along with infections such as parvovirus, herpes zoster, rubella, cytomegalovirus, syphilis and herpes simplex virus (also known as TORCH group of infections) are the most serious infectious disease during pregnancy that could lead to embryo-foetal lesions[1]. It is well recognized that at least 12-15% of all conceptions end in miscarriage, and pre-clinical pregnancy loss is around 22- 30% due to the TORCH infections[1].Toxoplasmosis is a cosmopolitan disease caused by coccidian protozoan parasite Toxoplasma gondii, an obligate intracellular parasite that forms cyst in mammalian tissues of the body[2]. In most healthy human adults T.gondii infection is asymptomatic and does not cause serious illness, but it can cause blindness and

mental retardation in congenitally infected children and devastating disease in immunocompromised individuals [2].

Transmission rate to the foetus increases from 15-65% with increasing gestational age [3]. Approximately 30% of the world's human population is affected by this parasite and the third main cause of food-related deaths in the United States of America [4].Toxoplasmosis present as multiracial disease having seropositivity ranging from less than 10% to over 90%[5].

Infection in humans and other warm-blooded animals can occur by following modes -

1. By consuming T.gondii tissue cysts contained raw or undercooked meat[6].
2. By ingesting water, soil, vegetables, or anything contaminated with oocysts shed in the feces of an infected animal[6].
3. Transplacental transmission from mother to foetus, particularly when T. gondii is contracted during pregnancy[7][8][9].
4. From an organ transplant[10][11]or blood transfusion (through this is rare)[12].

This study was undertaken to determine Toxoplasma IgG profile of suspected patients with bad obstetric history and to evaluate the prevalence of Toxoplasmosis amongst females of bad obstetric history after studying Toxoplasma IgG profile by ELISA attending IIMSR, Lucknow.

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MATERIAL AND METHODS

Study Area –Study subjects attending the OPD/IPD at Integral Institute of Medical Sciences and Research, Integral University, Lucknow were included in the study.

Study Duration - It was a study of six months starting from February 2019 – June 2019.

Inclusion Criteria – Patients complaining of Bad obstetric history (BOH) describing previous unfavourable fetal outcome in terms of two or more consecutive spontaneous abortions, history of intrauterine fetal death, intrauterine growth retardation, stillbirths, early neonatal death, and/or congenital anomalies suspected of Toxoplasmosis infection were included in this study.

Exclusion Criteria- Women having fetal congenital malformations due to any injuries during pregnancy were not included in the study.

Ethical Permission and Approval – The research project was approved by the Institutional Research Committee (IRC) & the Institutional Ethical Review Committee (IEC).

Strategy for Collection -

The study subjects were personally interviewed and were administered a detailed questionnaire which was then included in the study prior to any operative procedures to be performed if needed. After obtaining consent, Serum samples of patients attending OPD and IPD of OB/GYNAE department were taken, transferred and processed in Microbiology department.

The blood sample was drawn from median cubital vein through venipuncture by phlebotomist and collected in a clean clot activator vial and the blood was allowed to stand for 30 minutes to produce clot followed by centrifugation at 5000 rpm after which the TOXOPLASMA IgG ELISA test was performed TOXOPLASMA IgG ELISA (CALBIOTECH, CALFORNIA) test was performed according to the standard operating guidelines. The results were interpreted on the basis of Immune status ratio (ISR) index and calculated by dividing the specimen OD value by the cut-off calibrator ratio.

Statistical Analysis

Data was analysed using SPSS version 18.0 for statistical analysis. Proportion and mean(Std. Deviation) were calculated wherever applicable. Chi-square test was used to compare significance of difference between two proportions. Value of $p < 0.05$ was taken as significant statistically.

RESULTS

A total of 85 women who attended the department of gynaecology at IIMS&R, Lucknow with mean age group of 28.3 years and age range of 20 – 35 years participated in this study.

Out of total 85 patients, 16 (18.8%) cases were seropositive for toxoplasma IgG antibodies whereas 69 (81.2%) cases tested negative.

Various demographic characteristics were included in the study such as gender, age, previous bad obstetric history (still births, pre-term delivery, abortion, intrauterine growth retardation and congenital malformation), status of gravidation, pregnancy, gestational age, place of residence, religion, consumption of raw meat and exposure to cats.

Fig 1: Total cases included in the study with distribution of positive and negative cases.

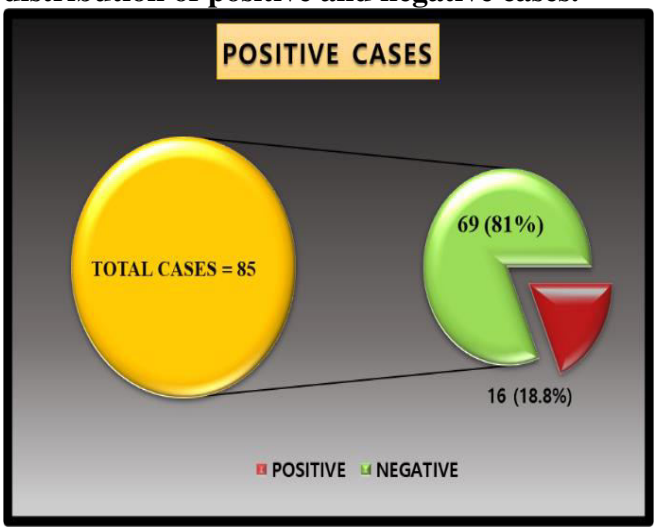


Fig 2: Demographic characteristics of total cases, positive cases and negative cases included in the study

Characteristics	Positive Cases	Negative cases	Total
Rural	9	57	66
Urban	7	12	19
Hindu	9	40	49
Muslim	7	29	36
Consumption of raw meat	3	8	11
Exposure to cats	4	7	11

Majority of cases (88%) belonged to age group of 20-40 years where 47 (55%) cases fall in the age group of 20-30 years whereas 28 (33%) cases belonged to the age group 30 – 40 years. There were no seropositive cases in the age group of < 20 years whereas 9 cases were positive in age group of 20 – 30 years, 5 cases in age group of 30 – 40 years and 2 cases were seropositive in the age group >40 years.87% seropositive cases belonged to the group of 20 – 40 years where 56% positive cases were present in the age group of 20 - 30 years and 31% positive cases in the age group of 30 – 40 years.

On the account of total cases which were included in the study, 70 cases (82%) were in various trimesters of pregnancy, while on the contrary 15 cases (18%) in this study, were non-pregnant women. A majority of seropositive cases for toxo IgG were observed in pregnant women (11, (68.7%) and 4 (25%) cases of non-pregnant women were seropositive for IgG.

Fig 3: Age distribution of Seropositive cases

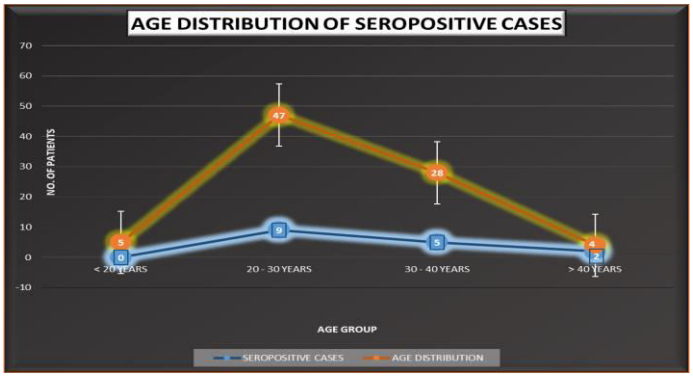


Fig 4: Gestational age distribution of study subjects

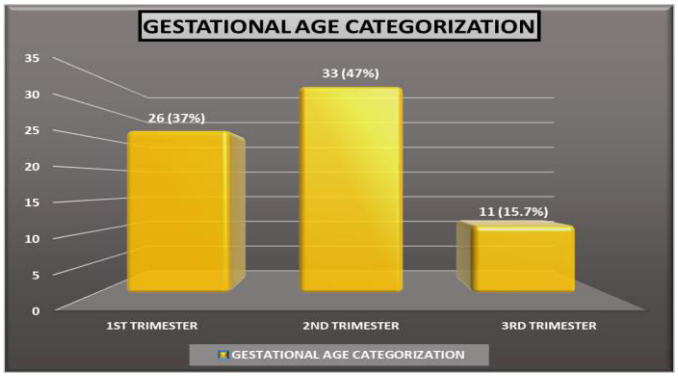
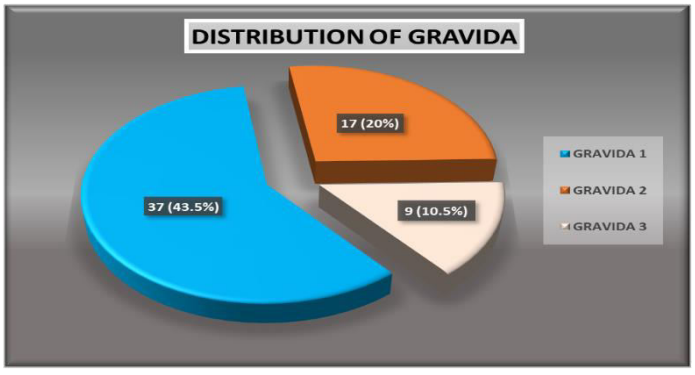


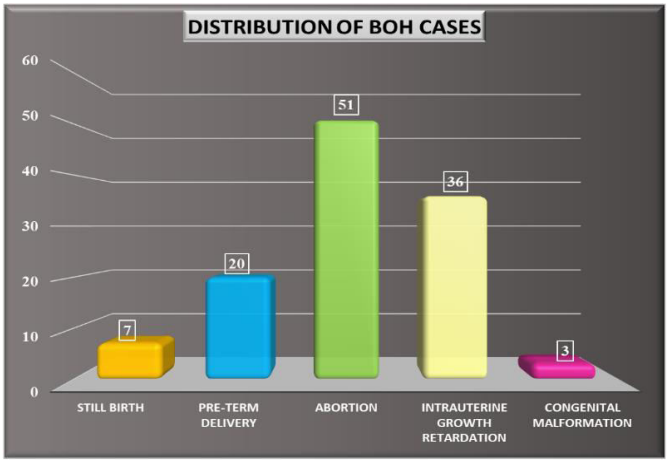
Fig 5: Distribution of cases according to Gravida status



On evaluation of seropositive cases of IgG TOXO antibody in relation to gravida status, 9 cases (56%) were seropositive for IgG among which 5 (55%)

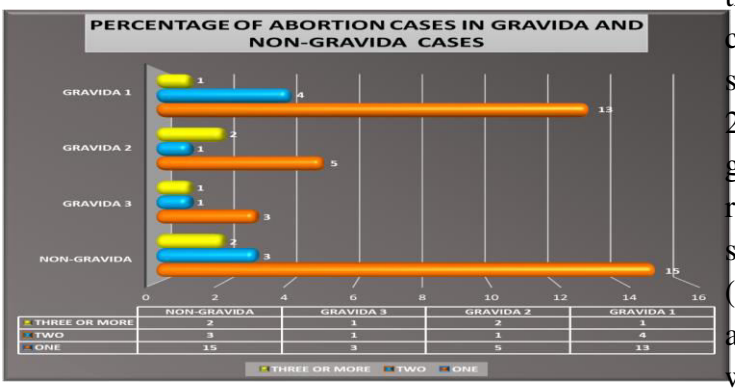
cases were of gravida 1, 3 (33%) cases of gravida 2 and 1 (11%) case of gravida 3 respectively. On comparative analysis of previous BOH in patients, maximum cases (51, 60%) had history of abortion, 36 cases (42.3%) had history of intra- uterine growth retardation, 20 cases (23.5%) had undergone pre-term delivery, 7 cases (8%) had still-births and 3 cases (3.5%) had congenital malformation. Among 51 cases of abortion, 7 cases were seropositive for TOXO IgG. Of 20 cases of pre-term delivery, 5 cases were seropositive and among 7 cases of still-birth, 4 cases were seropositive for TOXO IgG. There were no seropositivity in cases of intra-uterine growth retardation and congenital-malformation.

Fig 6: Distribution of cases according to bad obstetric history



On comparing the gravida cases with previous bad obstetric history, maximum cases (36 cases) had single abortion followed by 2 abortions (9 cases) and then three abortions (6 cases).

Fig 7: Total percentage of Abortion cases in Gravida and Non-Gravida cases



DISCUSSION

Toxoplasma gondii is an intestinal coccidium that parasitizes members of the cat family as definitive hosts and has a wide range of intermediate hosts. Infection is common in many warm-blooded animals, including humans. In humans, it is one of the most common parasites [15].Toxoplasmosis is not a new disease. The parasite was discovered in 1908 but its mode of transmission remained a mystery until 1970 when the full life cycle was discovered. Only cats can excrete the resistant stage of T. gondii (the oocyst) in faeces. The oocysts are formed as a result of sexual cycle in the intestine of the cats.[16] If a woman is pregnant and becomes newly infected with Toxoplasma during or just before pregnancy, she can pass the infection to her unborn baby (congenital transmission). The damage to the unborn child is often more severe the earlier in pregnancy the transmission occurs[17].

This study was conducted to find out the seroprevalence of TOXOPLASMA IgG antibodies in patients with bad obstetric history (BOH). Several no. of socio-demographic characteristics and comparative analysis of the factors with seropositivity of TOXO IgG antibodies along with impact of toxoplasmosis on outcomes of pregnancy were also studied.In this study, 85 cases were enrolled among which 16 cases were seropositive for toxoplasma IgG antibodies indicating chronic infection whereas 69 cases were seronegative. Therefore the prevalence was reported to be 18.8% which was similar to the study done by Singh et al in 2016[5] and Patel et al in 2014[13].

There was no significant relation between above given socio – demographical characteristics with toxoplasmosis. 56% positive cases were present in the age group of 20 - 30 years and 31% positive cases in the age group of 30 – 40 years which was similar to the study done by Borkakoty et al in 2007[14] (58% and 29% seropositivity in the age group of 20 – 30 years and 30 - 40 years respectively.There was an increasing trend of seropositive cases with increase in age >20 years (20- 40 years) followed by decline in positive cases at age above 40 years. This finding corroborates with the findings of Nowakoska D et al in 2006[18] and Sarkar MD et al in 2012[19].Most of the cases participated in the study were of gravida 1 category

where patients in stage of gravida 1 had majority of seropositive cases (55%) followed by gravida 2 and 3 respectively. This finding was similar to Ashrafunnesha et al in 1998[20]. 68.7% pregnant cases were seropositive for Toxo IgG antibodies accounting for majority of seropositive cases where major cases were of 2nd and 1st trimester, 50% and 31% respectively which was similar to Singh et al in 2016.Cases of abortion and pre-term delivery acquired major part of seropositive cases (75%) which can be corroborated with studies of Surpam RB et al in 2006[21] and Chopra S et al in 2004[22].

The persistence of encysted forms of toxoplasma in uteri of chronically infected women can rupture during placentation thereby transmitting infection to the baby in 1st and 2nd trimester leading to miscarriage[23].

Because most of the population (75%) of India lives in rural villages with little means to get to city hospitals, the data are not reflective of the population as a whole [24]. Moreover, symptoms of toxoplasmosis are not specific, diagnosis is aided by serologic examination[15]. Numerous serologic tests are available to detect IgG and IgM T. gondii specific antibodies[25].T. gondii antibody titres, and titres may remain elevated for several years. Previous history of pregnancy wastages and positive serological reactions during the current pregnancy must be considered while managing BOH cases so as to reduce the adverse fetal outcome [26].

CONCLUSION

This study contributes to the fact that toxoplasma infection plays a pivotal role in unpropitious foetal outcome. The socio-epidemiological aspects also played an important contributing role in the spread of the disease.

Considering that toxoplasmosis is persuadable to treatment, early detection with incessant serological examination and treatment in all pregnancies can bring down the hazard to a great extent. Both toxoplasma specific IgG and IgM antibodies based routine serological screening should be prescribed counselled and advised to all pregnant women. Even for those females with negative results, targeted IEC activities and counselling related to preventive and protective measures are of major significance.

REFERENCES

1. Neha TS, Dhole TN, Sankhwar PL. Status of Torch Infections in Women of Child Bearing Age Group in Uttar Pradesh. International Journal of Innovative Research in Medical Science 2017; 2(10):1391-1396. https://doi.org/10.23958/ijirms/vol02-i10/07
2. Siddiqui N, Shujatullah F, Khan HM, Rabbani T, Khan PA. IgG Avidity Antibodies against Toxoplasma gondii in High Risk Females of Reproductive Age Group in India. *Korean J Parasitol.* 2014;52 (5): 487-491.
3. Khurana S, Bagga R, Aggarwal A, Lyngdoh V, Shivapriya, Diddi K et al. Serological screening for antenatal toxoplasma infection in India, Indian Journal of Medical Microbiology 2010; 28(2): 143-6.
4. Eskandarian AA, Jafarnezghad G, Akbari M. Seroprevalence of toxoplasma-specific antibodies in patients suspected to have active toxoplasmosis: A cross-sectional survey. Adv Biomed Res 2014;3:236.
5. Singh M, Ranjan R, Pradeep Y, Quereshi S, Sahu M. Seroprevalence of toxoplasmosis in pregnant females attending a tertiary care hospital in Uttar Pradesh, India and its effect on perinatal morbidity and mortality. Acta Medica International. 2016;3(1):50-55.
6. Toxoplasmosis in India. Singh S (Editor.). Third Edition, Pragati Publishing Company, Ghaziabad & New Delhi, 2010. 33.
7. Desmonts G & Couvreur J. Congenital toxoplasmosis. A prospective study of 378 pregnancies. N Eng J Med 1974; 290:1110-1116.
8. Daffos F, Forestier F, Capella-Pavlovsky M, et al. Prenatal management of 746 pregnanciesat risk for congenital toxoplasmosis. N Eng J Med 1988;318:271-275.
9. Remington JS, McLeod R, Desmonts G. Toxoplasmosis. In: Remington JS, Klein JO, eds. Infectious diseases of the foetus and newborn infant. 4th Ed. Philadelphia: Saunders Company, 1995;140-267.
10. Slavin MA, Meyers JD, Remington JS, Hackman RC et al. Toxoplasma gondii infection in bone marrow transplant recipient: A 20 year experience. Bone Marrow Transplant 1994;13:549-57.
11. Wreghitt TG, Hakim M, Gray JJ, Balfour AH, Stovin PG, Stewart S et al. Toxoplasmosis in heart and lung transplant recipients. J Clin Pathol 1989;42:194-199.
12. Singh S, Ahlawat S, Singh N, Chaudhary VP. High Torch seroprevalence rate in multiply

transfused B- Thalassemic children in India. Eur J Haematol 1994; 54: 64-6
13. Patel KK, Shrivastava G, Bhatambare G, Bajpai T. Antenatal detection of IgM and IgG antibodies to Toxoplasma gondii in a hospital from central India. Int J Health Syst Disaster Manage 2014;2:133-5.
14. Borkakoty BJ, AK Borthakur, Gohain M. Prevalence of Toxoplasma gondii Infection amongst Pregnant Women in Assam, India Indian Journal of Medical Microbiology 2007;25(4): 431-32.
15. Baron S, editor. Medical Microbiology. 4th edition. Galveston (TX): University of Texas Medical Branch at Galveston; 1996.
16. Singh S. Transmission and Diagnosis of T. gondii Infection. Indian Journal of Medical Microbiology 2003; 21 (2):69-76.
17. Toxoplasmosis fact sheet, WHO Estimates of the Global Burden of Foodborne Diseases. 2015.
18. Nowakowska D, Stray-Peterson B, Spiewak E, Sobala W, Malafiej E, Wilczynski J. Prevalence and estimated incidence of Toxoplasma infection among pregnant women in Poland. Clinical Microbiology and infection 2006; 12(9): 913.
19. Sarkar MD, Anuradha B, Sharma N, Roy RN. Seropositivity of toxoplasmosis in antenatal women with bad obstetric history in a tertiary-care hospital of Andhra Pradesh, India. J Health Popul Nutr 2012; 30: 87-92.
20. Ashrafunnesha, Khatun S, Islam MN, Huq T. Seroprevalence of Toxoplasma antibodies among the antenatal population in Bangladesh. J. Obstet. Gynaecol. Res. 1998; 24(2): 115-19.
21. Surpam RB, Kamlakar UP, Khadse RK, Qazi MS, Jalgaonkar SV. Serological study for TORCH infections in women with bad obstetric history. J Obstet Gynaecol India.2006; 56(1):41-43.
22. Chopra S, Arora U, Aggarwal A. Prevalence of IgM antibodies to toxoplasma, rubella and cytomegalovirus infections during pregnancy. J K Science 2004;6(4):190-2.
23. Langer H. Repeated congenital infections with Toxoplasma gondii. Am J Obstet Gynecol 1963; 21:318-29.
24. Saba J, Morlat P, Raffi F, Hazebroucq V, Joly V, Leport C, Vildé JL et al. Pyrimethamine plus azithromycin for treatment of acute toxoplasmic encephalitis in patients with AIDS. Eur J Clin Microbiol Infect Dis 1993;12:853-6.
25. Dubey JP. Sources of Toxoplasma gondii infection in pregnancy. BMJ 2000;321:127-8.
26. Saad A, Rahi SJ, Hussein BW. Serological study for TORCH Infections by ELISA Method in Women with Bad Obstetric History in Kerbala City. Karbala J. Med. 2013; 6(2): 1621-24.

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