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Research Article

Incidence of Traumatic Sub-Arachnoid Hemorrhage in Nangarhar Province

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About Article

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ABSTRACT

This study aims to ascertain the causes, clinical findings, and incidence of traumatic subarachnoid hemorrhage (TSAH) in various age groups, genders, and etiologies (the mechanism of trauma that causes TSAH) in accordance with the severity of trauma as measured by the Glasgow Coma Scale (GCS). Finding the TSAH risk factors in the Afghani community is the goal. The incidence of Traumatic Subarachnoid Hemorrhage (TSAH) was determined by doing a meta-analysis and systematic review based on the available data. In order to help different healthcare professionals such as researchers, surgeons, policymakers, caregivers, and patients—identify high-risk individuals, avoid TSAH, and further explore the underlying mechanisms, the study sought to provide pooled estimates. More research is being done to determine the risk factors for TSAH. Previous research has looked at occurrence according to the severity of the trauma based on the Glasgow Coma Scale (GCS), gender, age groups, and the etiology of the trauma (the mechanism of trauma that causes TSAH). It is vital to comprehend the prevalence of Traumatic Subarachnoid Hemorrhage (TSAH) in order to enhance patient outcomes and lessen the toll that it takes on both individuals and society. Healthcare providers can more effectively customize interventions, treatment programs, and preventive measures for people at high risk for TSAH by recognizing and elucidating these incidences. The results of this study could have a major impact on the creation of mitigation methods for the incidence of trauma-related subarachnoid hemorrhage (TSAH) among Afghani people.

Citation Style:

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1. INTRODUCTION

Traumatic subarachnoid hemorrhage (tSAH) is a common injury, and trauma is the most common cause of subarachnoid hemorrhage (SAH) (Cooper *et al.*, 2019). Traumatic subarachnoid hemorrhage occurs in ~35% (range 11-60%) of traumatic brain injuries (Wu, 2010). Traumatic subarachnoid hemorrhage is more commonly seen in the cerebral sulci (i.e. convexal subarachnoid hemorrhage) than in the Sylvian fissure and basal CSF cisterns (Wu, 2010). When in the basal cisterns, it has an affinity for the quadrigeminal cistern and ambient cistern (Gan & Choksey, 2006). tSAH is also commonly seen adjacent to skull fractures and cerebral contusions (van Gijn & Rinkel, 2001).

The exact mechanism of tSAH remains uncertain although it is clear that a number of etiologies exist and these will determine, at least to a degree, the distribution of blood. Causes of tSAH include (Modi *et al.*, 2016). Direct extravasation of blood from an adjacent cerebral contusion arterial dissection direct damage to small veins or arteries sudden increase in intravascular pressures leading to rupture. CT of the brain is almost always the first scan obtained in the setting of trauma, often as part of a CT panscan.

Although the sensitivity of CT to the presence of subarachnoid blood is strongly influenced by both the amount of blood and the time since the hemorrhage, in the setting of trauma scans are almost always obtained early, often mere minutes or hours from head injury, making even small amounts of blood readily visible. The distribution and amount of blood varies greatly depending on the underlying mechanism (described above) and from patient to patient.

Often a small amount of blood is seen filling a few sulci, sometimes with an adjacent cerebral contusion. Small amounts of blood can also sometimes be appreciated pooling in the interpeduncular fossa, appearing as a small hyperdense triangle, or within the occipital horns of the lateral ventricles. Occasionally, and worrying for an underlying arterial dissection or an aneurysmal hemorrhage that preceded trauma, larger amounts of blood may be seen around the circle of Willis and within the posterior fossa.

Traumatic subarachnoid hemorrhage has a better prognosis than aneurysmal SAH (Gan & Choksey, 2006). The most severe Complications of SAH is cerebral vasospasm and communicating hydrocephalus. It can be difficult to delineate from tSAH, particularly as in many instances the cause of head trauma may have been spontaneous subarachnoid (e.g. while driving).

The distribution of blood, particularly if closely related to cerebral contusions can suggest traumatic etiology, whereas extensive blood around the circle of Willis should prompt arterial imaging to exclude an aneurysm. Distinguishing between aneurysmal subarachnoid hemorrhage and traumatic non-aneurysmal subarachnoid hemorrhage is not always possible, and the trauma may have in reality been precipitated by a spontaneous aneurysmal hemorrhage (e.g. while driving).

That having been said, there are helpful features in suggesting that subarachnoid hemorrhage is the result of trauma, rather than the reason for trauma. These features include: Documented (witnessed) trauma not being preceded by a headache or loss of consciousness or seizure Subarachnoid blood being relatively minor and associated with cerebral contusions Subarachnoid blood located over the convexity of the brain rather than around the circle of Willis or posterior fossa Location of subarachnoid blood deep to scalp hematoma or in a countercoup distribution.

1.1. Significance of the study

This study on the incidence of traumatic subarachnoid hemorrhage between January 10, 2018, and January 10, 2019 is significant because it has the potential to significantly advance clinical practice and research in the field of brain health.

2. LITERATURE REVIEW

Several studies have investigated the outcomes of traumatic subarachnoid hemorrhage in different contexts. Among these, Muhammad Ishfaq, Mumtaz Ali, Muhammad Ahmed Alfaqeeh, and Saud Alnashri conducted a study in 2018, titled "Outcome of Traumatic Subarachnoid Hemorrhage in Patients Presenting to the Neurosurgery Department at Lady Reading Hospital Peshawar." This research focuses on the clinical outcomes of patients with traumatic subarachnoid hemorrhage (tSAH) treated at a major healthcare facility in Peshawar. By analyzing patient data, the study provides valuable insights into the management strategies and prognostic factors associated with tSAH in a developing country context (Ishfaq *et al.*, 2018).

Muhammad Amir Sagher, Farhad Hussain, Muhammad Rafay, Farhan Gulzar, and Salman Sharif conducted a study in titled "Functional Outcome of the Patients with Acute Subdural Hematoma Treated Surgically within 4 hours of Injury." This research, carried out at the Department of Neurosurgery, Liaquat National Hospital in Karachi, Pakistan, aimed to analyze patient outcomes by employing the Modified Fisher Grade. The study provides a detailed comparison of clinical prognoses associated with varying grades of tSAH, offering critical insights into the role of imaging-based grading systems in predicting patient outcomes. (Gulzar, Sagheer, Hussain, Rafay, & Sharif, 2020). The following results summarize the conclusions from all the above-mentioned studies:

A total of 195 patients met the inclusion criteria. Of these, 37 patients (19%) were under the age of 20, 94 patients (48%) were between 21 and 40, 45 patients (23%) were between 41 and 60, and 19 patients (10%) were over 60. The mean age was 32 years (± 2.12 SD). Patients were also divided by gender, with a majority of male patients (140 or 72%) compared to female patients (Fig. 1). Regarding the etiology of traumatic subarachnoid hemorrhage, blunt trauma was the least common cause, accounting for 25 cases (12.82%), while recurrent trauma was the most prevalent, with 115 cases (58.97%). Falls from height were the second most common cause, with 55 cases (28.20%). 138 patients (70.76%) had an initial GCS score between 3 and 8, while 57 patients (29.4%) had a score between 9 and 15 at the time of admission. Among the 195 cases analyzed for traumatic subarachnoid hemorrhage, 78 patients (40%) had a favorable outcome with a Glasgow Outcome Scale (GOS) score greater than 3, while 60% of patients had an unfavorable outcome. Age and gender-specific results for traumatic subarachnoid hemorrhage are also provided.

3. METHODOLOGY

A rigorous process combining a systematic review and meta-analysis was painstakingly carried out in the quest to find predictors for Incidence Traumatic Sub Arachnoid Hemorrhage (ITSAH). This methodology was created with the intention of providing thorough insights into this important facet of lumbar brain health by combining and analyzing the available data regarding TSAH occurrence.

3.1. Systematic Review

A comprehensive and rigorous analysis of pertinent literature, including studies, research papers, and clinical data pertaining to TSAH incidence, was conducted as part of the methodology's systematic review phase. The thorough evaluation procedure was designed to guarantee that only reputable, peer-reviewed sources were included, which improved the findings' validity and dependability.

3.2. Meta-Analysis

A meta-analysis was carried out to compile and examine the combined data on ITSAH incidence after the systematic review. The goal of this phase was to provide pooled estimates by using statistical techniques and data synthesis tools to combine the results from various research. The goal of the meta-analysis was to offer a more comprehensive and nuanced knowledge of the factors linked to ITSAH by statistically evaluating the pooled data.

3.3. Objective

This methodological approach's major goal was to provide useful information about ITSAH incidence to a range of healthcare stakeholders, such as researchers, surgeons, policymakers, caregivers, and patients. This work aims to support future research into the underlying mechanisms leading to ITSAH, assist in identifying high-risk populations, and guide preventive efforts by providing pooled estimates generated from the systematic review and meta-analysis.

3.4. Implications

This study's methodological methodology attempted to close the gap between research findings and real-world implementations in clinical settings in addition to improving the ITSAH. This methodology sought to equip medical practitioners with the knowledge and skills needed to improve patient outcomes, hone treatment strategies, and lead the way in the management of brain trauma-related alterations and disorders by offering evidence-based recommendations on the prevalence of ITSAH.

4. RESULTS AND DISCUSSION

4.1. Total Number of Trumatic Sub Arachnoid Hemorrage

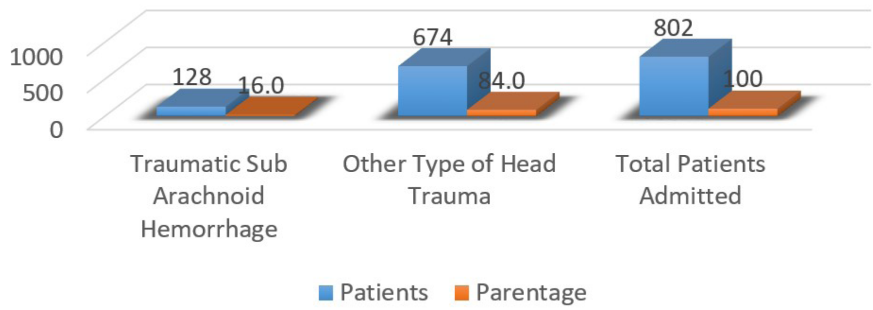

Figure 1. Total number of trumatic sub arachnoid hemorrage

Figure 1. Shows the total number of patients (802) that I found throughout my investigation. Of these, 128 patients (16%) had traumatic subarachnoid hemorrhage. There are 674 patients (84%) with different kinds of head traumas.

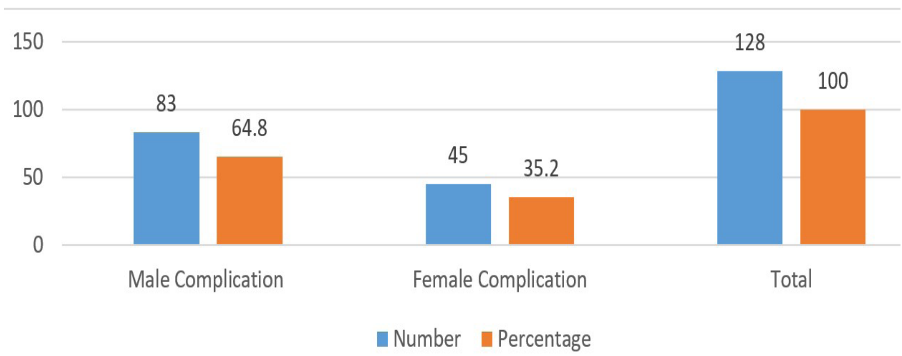

Figure 2. Incidence of traumatic subarachnoid hemorrhage according to gender

4.2. Incidence of Traumatic Subarachnoid Hemorrhage according to gender

Figure 2. Shows the patients by gender: 45 patients (35.2%) and 83 patients (64.8%) made up the female patient population.

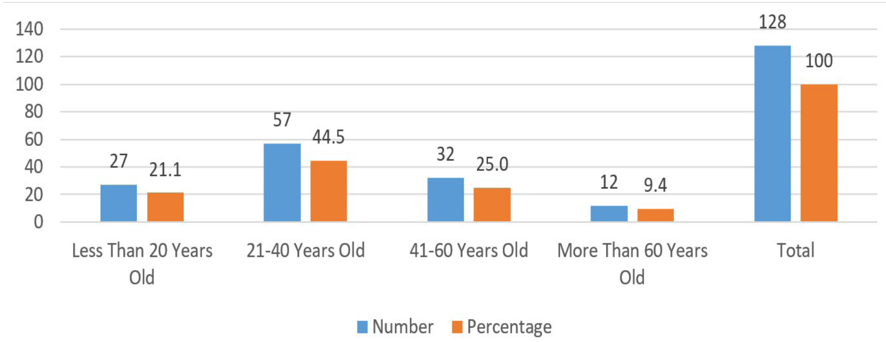

Figure 3. Incidence of traumatic subarachnoid hemorrhage according to age

4.3. Incidence of Traumatic Subarachnoid Hemorrhage according to Age

Based on age, 27 patients (21.1%) who completed the study were less than 20 years old, and 57 patients (45.5%) who completed the study were between the ages of 21 and 40. Twelve patients, or 9.4% of the total, are older than 60. Of the 32 patients who made up 25% of the study and are between the ages of 41 and 60.

symptoms and coma state.

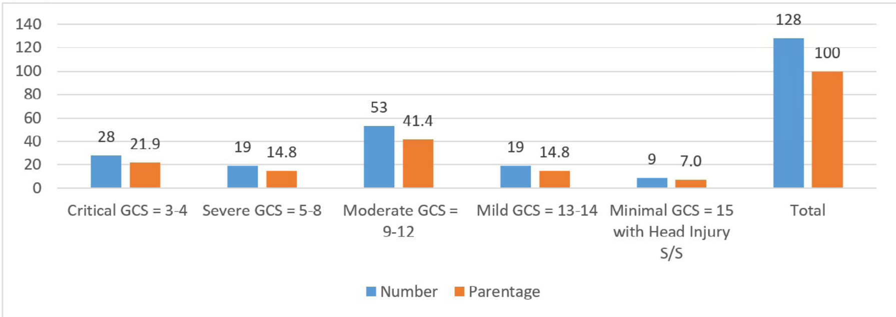

Figure 4. Incidence of Traumatic Subarachnoid Hemorrhage according to Severity (GCS)

4.4. Incidence of Traumatic Subarachnoid Hemorrhage according to Severity (GCS)

Using the Glasgow Coma Scale (GCS), which measures trauma severity, the following patients were made: 28 patients (21.9%) had GCS 3–4 with critical coma condition, 19 patients (14.8%) had GCS 5-8 with severe coma condition, 53 patients (14.4%) had GCS 9–12 with moderate coma condition, and 19 patients (14.8%) had GCS 13–14 with mild coma condition. Moreover, nine patients, or 7% of the total, had GCS 15 with mild brain damage general clinical symptoms and coma state.

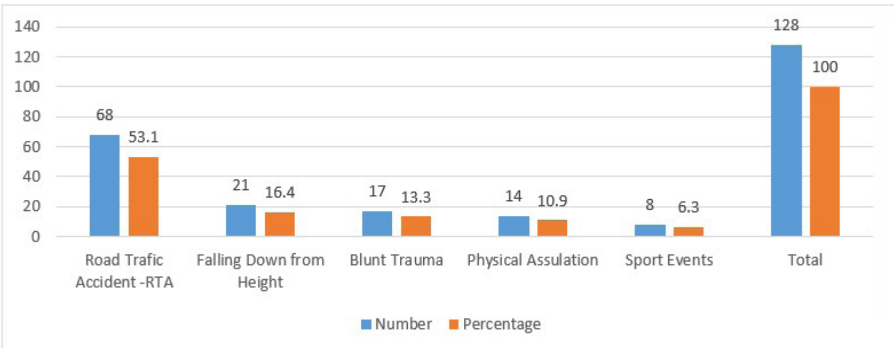

Figure 5. Incidence of traumatic subarachnoid hemorrhage according to couse of trauma

4.5. Incidence of Traumatic Subarachnoid Hemorrhage according to Couse of Trauma

The etiology of TSAH states that 68 patients, or 53.1% of the total, suffered from road traffic accidents (RTAs), and 21 patients, or 16.4% of the total, suffered from falls from a height. There were 17 patients (13.3%) who experienced blunt trauma, 14 patients (10.9%) who patience physical assault, and 8 patients (6.3%) who experienced trauma from sporting events.

4.6. Discussion

In the field of brain health, the study on the incidence of traumatic subarachnoid hemorrhage between January 10, 2018, and January 10, 2019 has important ramifications for theory, practice, and policy. This research has the potential to impact clinical practice and healthcare policy by exploring the intricacies of TSAH incidence and finding important factors.

The goal of this scoping review was to clarify the evidence that is currently available for TSAH diagnosis and treatment. In the end, we didn't find much information about diagnostic ability. The majority of research concentrated on clinical outcomes, management, and prognosis. It was discovered that the research could be divided into five groups: post-TSAH aneurysm; TSAH and imaging; TSAH and TBI; clinical prognosis, management, and outcomes. The evidence found for each of the five categories, the limits of the scoping study, and suggestions for further research are the main topics of this debate.

In comparison to other research, my study's year-over-year total of 128 patients treated accounted for 16% of all head injuries. This low patient population is a result of Afghanistan's underdeveloped patient referral system. Males are more likely than females in my study to have TSAH, and patients between the ages of 21 and 40 are more likely than those in other age groups to be surfed.

According to my research, the majority of your patients experienced road traffic accidents (RTAs); this finding is consistent with other studies. Approximately 50% of patients have been diagnosed with moderate GCS, based on the severity of their trauma as determined by GCS scores.

The following charts demonstrate the above-mentioned statement's result in comparison to the three works of literature chosen for this investigation:

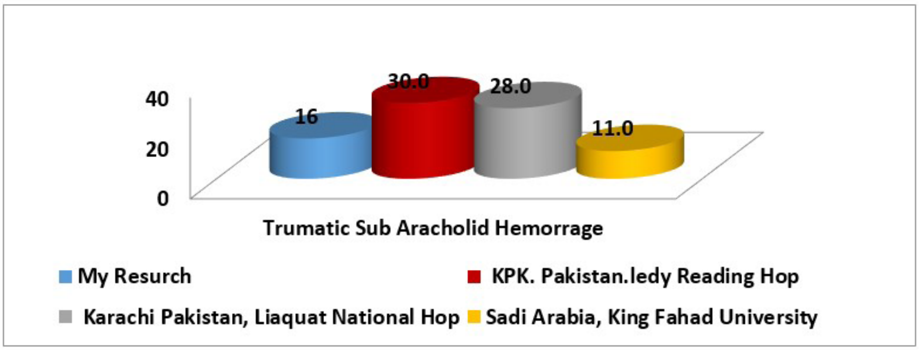

Figure 6. Compare incidence of traumatic subarachnoid hemorrhage

4.7. Compare Incidence of Traumatic Subarachnoid Hemorrhage

Figure 6. Shows the frequency of Traumatic Subarachnoid Hemorrhage (TSAH) is compared across the three selected studies. Transportation issues, including the distance between cities and regional hospitals, are significant factors contributing to delays in patients reaching hospitals, or in some cases, preventing them from accessing care altogether. Additionally, poor road conditions further complicate patient transportation.

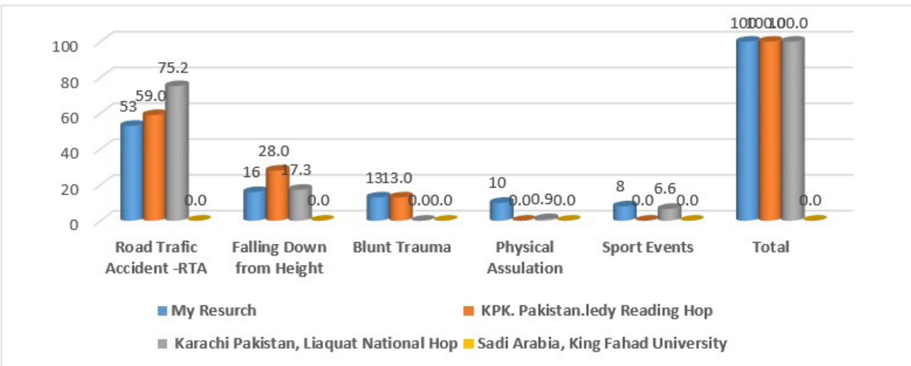

Figure 7. Compare of traumatic subarachnoid hemorrhage incidence accorder to etiology

4.8. Compare of Traumatic Subarachnoid Hemorrhage incidence accorder to Etiology

Figure 7. Compares my research with three studies on the etiology of Traumatic Subarachnoid Hemorrhage (TSAH). Road traffic accidents (RTAs) are one of the most prevalent causes of TSAH. In the Afghan region of Nangarhar, the prohibition of motorbike riding has reduced such incidents, whereas Pakistan has a notably higher rate of motorcycle-related accidents.

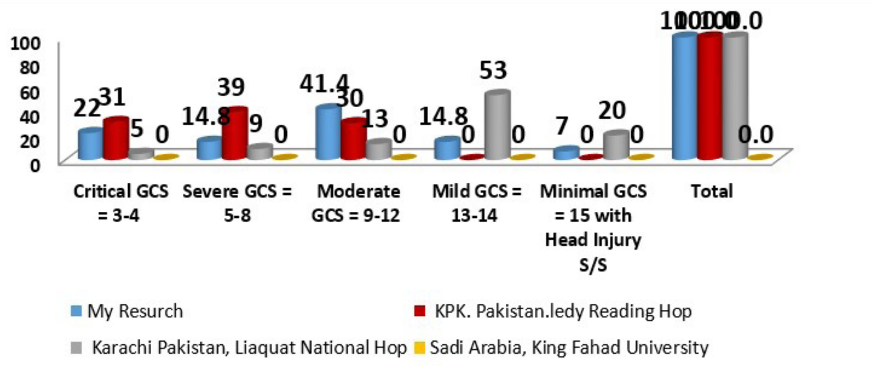

Figure 8. Compare of traumatic subarachnoid hemorrhage incidence accorder to severity

4.9. Compare of Traumatic Subarachnoid Hemorrhage incidence accorder to Severity

Figure 8. Compares my research findings with three literatures based on the GCS of TSAH patients. In my study, a majority of patients had moderate GCS, whereas a significant proportion of patients in Pakistan presented with severe GCS.

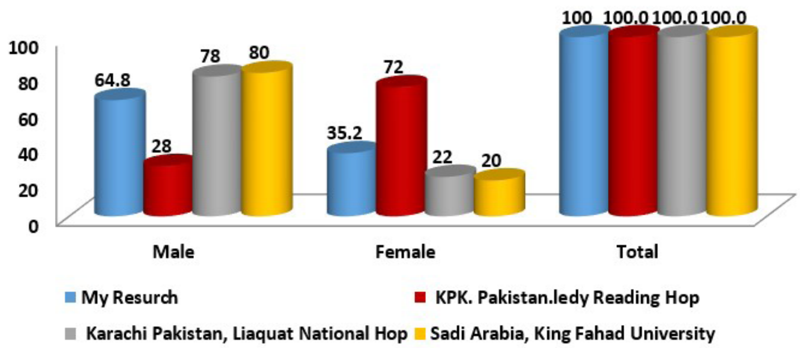

Figure 9. Compare of traumatic subarachnoid hemorrhage incidence accorder to gender

4.10. Compare of Traumatic Subarachnoid Hemorrhage incidence accorder to Gender

Figure 9. Compares my research with three literatures based on the gender of TSAH patients. In my study, males outnumber females, which aligns with two of the publications reviewed. However, in Karachi, Pakistan, the frequency of female TSAH patients is higher than that of males.

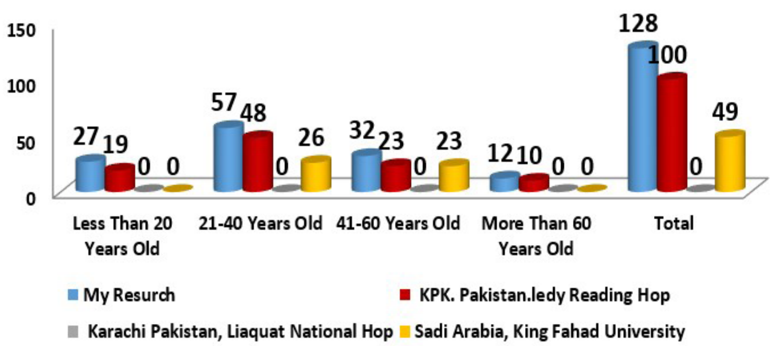

Figure 10. Compare of traumatic subarachnoid hemorrhage incidence accorder to age

4.11. Compare of Traumatic Subarachnoid Hemorrhage incidence accorder to Age

Figure 10. Compares my research to three literatures based on the age of TSAH patients: similar to other studies, the majority of affected individuals are between the ages of 21 and 40.

4.12. Study characteristics

In fourteen investigations, the patients were those who presented with a GCS score of 13–15. Overall, it was shown that the necessity for neurosurgical intervention was quite rare among these patients. According to one study, trauma patients who have an initial evaluation GCS score of 13–15 and imaging evidence of TSAH are unlikely to need neurosurgical consultation or transfer to tertiary care centers. In these cases, patients can safely be discharged, unless they have additional injuries or health problems that require inpatient management.17 Numerous other investigations concluded that patients in this category either rarely or never needed neurosurgical care.

Rarely do patients in this group develop radiographic progression, neurological impairment, or the need to be transferred to a higher-level hospital. Research conducted a year after the injury and revealed no difference in the outcome between patients with isolated SAH and those with normal CT scans. Notwithstanding the use of antiplatelet and anticoagulant medications, a study indicated that the incidence of neurological decline in TBI patients due to a growth of iTSAH is negligible.16 According to a different study, most individuals with low-grade TSAH have positive clinical outcomes and show no signs of neurological or medical impairment or post-traumatic seizure. This implies that patients might not need the same level of rigorous monitoring that is currently given to people who have TSAH.

The CT scan is not well connected with clinical advancement and may not be very effective in managing mild iTSAH. For certain patients, a less strident management approach might be more suitable.21According to a different study, no lesions significantly worsened 24 or 48 hours after the first scan. In order to prevent performing too many pointless scans, a control scan can be safely postponed for up to 48 hours, provided neurological stability is maintained.20

Numerous studies revealed significant ICU admission rates. In spite of their short ICU length of stay, patients with TSAH patients had higher likelihood of being admitted to the ICU, according to one study. This means that in order to maximize ICU utilization, healthcare facilities had to think about developing ICU criteria specifically for the mTBI group. When admitting MTBI patients to the ICU, variables including age, comorbidities, and neurological status may be more significant indicators to take into account than the presence of a modest volume of blood in the subarachnoid space. 15 When making decisions about ICU admission for this patient population, clinical expertise and acumen should be taken into consideration. However, the existence of ITSAH should not be taken as a sign that a patient with a clinically significant MTBI needs to be admitted to the critical care unit. Reassessing hospital-level procedures could give a chance to maximize resource efficiency.

The available data on TSAH linked to sTBI is not very extensive. Only three studies were included in the analysis. A relationship between improved mortality and a shorter period between surgical interventions was discovered. Aneurysmal SAH is the focus of the majority of studies assessing SAH and time to treatment. This is especially crucial for patients 43–45 who arrive at the ER with a low GCS score and a high-risk TBI mechanism in order to speed up the diagnostic and therapeutic procedures, which include the CT scan, initial resuscitation, consultation with a neurosurgery specialist, and transfer to the operating room. The results of a second investigation showed that the CT scores from Stockholm and Helsinki outperformed the CT scores from Marshall and Rotterdam. In order to efficiently target critical care and surgical therapy as soon as feasible, it might be necessary to investigate a shift toward these new scoring systems.

Although we expected that there would be more research on imaging and diagnosis, only three papers were found to be eligible for inclusion. It is improbable that considerable new pathology will be shown by repeat outpatient CT in asymptomatic patients following non-operative cerebral contusion and TSAH. It's possible that imaging should only be used for patients who have severe symptoms or focal findings on a neurological evaluation due to the expense and radiation exposure involved with CT. We also discovered that SWI might be able to identify IVH more accurately than CT. Small quantities of SAH have a significant impact on the SWI. This could be useful in helping to distinguish veins from SAH. On the other hand, basilar cistern SAH detection is a weak point for the SWI. All things considered, SWI might be able to give CT additional information.

Nine papers that addressed the prognosis and clinical management of TSAH were found. We discovered that iTSAH is a less severe intracranial damage that is unlikely to need for aggressive operational, medicinal, or endovascular intervention, regardless of the entrance GCS score. Additionally, it is not anticipated to be linked to a substantial increase in neurological morbidity or death, with the possible exception of older people.35 In the cohort of patients with TSAH, IVH, severe TSAH, age, and initial coma scale are independent predictors of poor outcome. Vasospasm is statistically substantially more common in people with severe TSAH.

We discovered that there is a risk of clinical and radiological worsening in individuals with iTSAH who have impaired coagulation, particularly in those who have increased INR. In patients with iTSAH, routine recurrence of the cranial CT scan is advised regardless of coagulation status in order to screen for radiological progression, which should prompt close monitoring if found. Compared to patients with an ITSAH, those with TSAH with concurrent cerebral hemorrhages have an increased adjusted OR of death.

Due to severe DAI, the appearance of midline TSAH on the first CT scan was linked to poor early and long-term outcomes. On the other hand, a good indicator of ruling out severe DAI was the lack of midline TSAH on the first CT scan. Moreover, the greatest thickness of TSAH did not correlate with the location or amount of bleeding, but it did correlate independently with neurological prognosis and death. Poor results and CT alterations are linked by the amount of subarachnoid blood and related parenchymal damage, which are independent factors associated with CT advancement. The findings refute the notion that nimodipine improves patient outcomes in those with TSAH.

5. CONCLUSIONS

Due to the worldwide burden of disease and its disproportionate impact on low- and middle-income countries, the TSAH represents a significant public health issue. It was discovered that there is a decreased likelihood of clinical deterioration and surgical intervention in individuals with TSAH linked to mTBI. Most of the time, high-intensity observations, required neurosurgical consultations, and routine CT scan implementation are not required. Imaging has a very important role in TSAH related to sTBI. By focusing on critical care and surgery early in the course of treatment, the Stockholm and Helsinki ratings may be able to enhance outcome forecasts. In addition to imaging, the decision tree that assesses head AIS, Cr, and age may be useful in identifying individuals who are more likely to die. In order to rule out post-traumatic aneurysmal SAH, CTA may be necessary if there is intraventricular bleeding with central TSAH.

The caliber of the included research is the main restriction on this scoping review, as it is with all of them. Since evaluating the quality of the included literature is not a standard part of scoping review technique, we did not employ any tools for this purpose. Because there were no randomized controlled trials, there was a greater chance of bias in the included research. The included studies can always be grouped in different ways. Nonetheless, we categorized the research into five groups according to our best interpretation of the available data.

RECOMMENDATIONS

There is a significant excess of evidence regarding TSAH and mTBI compared to TSAH and sTBI. Mortality, CT progression, neurosurgical intervention, and ICU course all require more study. More research is required in the field of diagnostic imaging. Rapid advancements in imaging are necessary to provide patients with the best care possible, and being able to diagnose problems quickly is crucial to this goal. Vasospasm is a frequent consequence of TSAH that is not well understood, so further research is required to determine its function in the condition.

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