Comprehensive Review on Vascular dementia Disease: Treatment and Recommendation for future research

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ABSTRACT: Vascular dementia (VaD) is the more progressive neurological impairment which affects the unrelenting dysfunction of brain capacity and it is brought about by reduced in the blood flow mainly to the brain. Sign and symptoms of vascular dementia (VaD) are, depression, anxiety, slower thinking, forgetfulness and loss of the executive task such as working memory, reasoning, execution of assignments, judgment, planning and problem solving. VICCCS classify vascular dementia into 4 major subgroups: Multi-infarct (cortical) dementia, Mixed dementia, Post-stroke dementia and Subcortical ischemic vascular dementia. This review article has emphasis on vascular dementia, its general introduction, characteristics, risk factors, sign and symptoms, diagnostic criteria of vascular dementia by ADDTC, NINDS, ADDTC and DSM-IV (such as Passive avoidance test, object recognition test, elevated plus maze test and Y maze test etc.) prevention and current treatment by the using drugs (such as donepezil's, gallantamine, memantine or other cholinesterase inhibitors, etc.) as well as recommendation for further research. We believe that a get lot of information from the recent research or review articles related to vascular diseases it’s risk, course, evaluation, treatment and understanding of conditions marked by a loss in cognitive function due to age disease history like hypertension, stroke, diabetes and Hyperlipidemia and modification of the life style. These review articles are more helpful for knowing overall about the vascular dementia but briefly emphasis on the treatment aspect and recommendation of further research along with mention the evaluation parameter and clinical assessment.

KEYWORDS: Vascular dementia (VaD), cognitive dysfunction, neurological impairment,

I. INTRODUCTION:
Vascular dementia (VaD) is the more progressive neurological impairment which affects the unrelenting dysfunction of brain capacity and it is brought about by reduced in the blood flow to the brain. Vascular dementia patients may experience illness related to the effects of forgetfulness, depression, anxiety, slower thinking, and loss of the executive task such as working memory, reasoning, execution of assignments, judgment, planning and problem solving. (1.)

Vascular dementia (VaD) is one of the most regular kinds of dementia. It is additionally portrayed as a neurocognitive problem, which likewise consolidates social side effects, locomotor abnormalities like Parkinsonian-like gait problems, dysarthria and autonomic brokenness. (2)

Risk of stroke is the most dangerous factor for enhancing the vascular dementia. The most grounded proof originates from investigations of hyperlipidemia, hypertension, diabetes mellitus and the metabolic disorder all these cause dementia problems. (3)

In the Systolic Hypertension in Europe has performed, placebo treatment for controlling the initial phase of hypertension treatment in older aged people’s treatment with a CCB (calcium channel blocker) and drastically effect with the decreased cognitive problems. (4)

Perindopril in the treatment of Recurrent Stroke Studies has performed that the preclinical treatment of hypertension along with the blood
pressure after stroke decrease in the cognitive problems (5)

Both “diabetes mellitus” (DM) and the “metabolic disorder” enhance the risk of dementia (6). Raised cholesterol seems to anticipate dementia right off the bat throughout everyday life, except an example of dropping cholesterol further down the road additionally is related with the beginning of dementia. (7)

Estrogen use in postmenopausal ladies has been related with both an expanded danger of stroke and increased cognitive decline and dementia (8,9) As a rule, most stroke chance elements are likewise chance components for dementia and cognitive impairment.

SIGNS AND SYMPTOMS

Early phase: In the earlier phase symptoms occur are combination of memories, space and time confusion and forgetfulness

Middle phase: In middle stage of vascular dementia having trouble eating, balance problems, behavioral changes like wandering, restlessness, swallowing, tremors, speech and language difficulties, and other difficulties are (problem-solving, communication, attention, repeated questioning); and memory problems (combination of memories, sequence of events, confusion of people etc.) (10,11)

Late phase: Marked by the most severe memory problems (such as not being able to recognize family members and acquaintances) behavioral changes (such as aggression, crying, anger) more physical issues, almost complete dependency and inactivity, unawareness of time and place, sadness, and anxiety, In all the forms of vascular dementia nearly invariably include behavioural and psychological symptoms such as agitation, delusions, irritability imbalance, sleep disturbances and motor behaviour. (12,13)

CLASSIFICATION:

“Vascular Impairment of Cognition Classification Consensus Study” (VICCCS) has been classified vascular dementia into mainly 4 subgroups: “Mixed dementia, multi-infarct (cortical) dementia, post-stroke dementia (PSD) and Subcortical ischemic vascular dementia (SIVaD)” (14). VICCCS provide the guidelines regarding for diagnosis of Vascular dementia with the help of Magnetic resonance imaging (MRI) and identification of vascular lesions that meet the criteria for identify the diagnosis of subtypes of VaD. Central illustration related to risk factor, sign and symptoms along with times sub-types of vascular dementia are given in below (Figure 1)
Epidemiological studies also lack consensus due to the issues in agreeing on clinical criteria for diagnosis and the variety of sources of cases mentioned above. Determination of the frequency of vascular dementia in people over 65 in Europe and North America from population-based research range from 1.2 to 4.2 percent (15). However, compared to Alzheimer’s disease, this rise in risk with ageing is far less pronounced. Pathological research on a few populations also suggests that the prevalence of pure vascular dementia is really much lower than these epidemiological studies suggest (figure 3).

The risk of hypertension is lower than stroke and Alzheimer’s disease found that it was only a risk factor for females studied by Canadian journals (16). Other risk factors for vascular dementia such as “cardiac disease, diabetes, orthostatic hypotension, elevated blood homocysteine levels smoking, obesity, major surgery, and hyperlipidemia”.

Diabetes contributed to virtually all of the dementia risk (17). Patients who are pre-diabetes and diabetes also typically cause risk factor of transitioning from mild to severe neurological impairment to dementia (18) Diabetes enhances the risk of vascular dementia, mainly when it develops in people throughout their middle years, such as between the ages of 65 and 80. (18)

Hypertension:
Ageing is a risk factor for hypertension, which increases the likelihood that someone may develop vascular dementia (19). Hypertension in middle age (mean age 54 years) might increase the risk of vascular dementia in old age (approximately 25 to 30 years later), in particular. A few systems central on white matter (WM) damage might help explain how hypertension affects vascular dementia: Raised blood pressure has been linked to White matter lesions in the ageing non-demanded population; uncontrolled and untreated hypertension is a significant risk factor for white matter lesions and accelerates the progression of vascular dementia disease.

Diabetes:
Metabolic disorder (MetS)

In any case, three of the most common cardiovascular risk factors, such as stomach/focal obesity, hypertension, large waistline, dyslipidemia, with low high-density lipoprotein (HDL) or high triglycerides cholesterol, and insulin resistance, such as high fasting blood glucose levels, combine to cause MetS. (Grundy et al., 2004 Feb 3). Metabolic disorder appears to have a large influence on cognitive impairments, but only in individuals younger than 70 years old (20, 21).

Evaluation of cognitive dysfunction

“The clinical diagnostic criteria for vascular dementia by the following include Association International pour la Recherche et l’ Enseignement Neurosciences (AIREN), ADDTC (Alzheimer’s Disease Diagnostic and Treatment Centers, National Institute of Neurological Disorders and Stroke (NINDS), DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, 4th edition) and ), ICD-10 (10th revision of the International Classification of Diseases)”(22,23), diagnostic criteria for the vascular dementia are given below:

1) “Novel object recognition test to test short/long term (1 h–24 h), visual learning and memory based on animal bias to explore new objects”. (24)
2) “Elevated plus maze test for anxiety related responses” (25)
3) “Open field test for anxiety problems” (25)
4) “Odor test for olfactory learning based on animal mostly preference for new smells” (26)
5) “Morris water maze or Barnes maze tests for spatial and visual learning and memory” (27)
6) “Y maze test to evaluate spontaneous alternation capacity of animals.” (28)

Different aspects of cognitive failure that Vascular patients suffer from summarize in the (figure 2).

Prevention of Vascular Dementia:

The important significant part of the preventative management of vascular dementia and evasion of further movement, is the aggressive management of risk factors. On the off chance that one needs to anticipate dementia, the best guidance is to complete a similar preventive way of life and medical estimates prevent to cardiovascular disease like strokes, heart attack and other heart problem and adopting work out, healthy diet plan, stop smoking, and keep away from the risk factor of diabetes, cholesterol level and blood pressure and all of them factor are more helpful for preventing to vascular dementia (29,30) Statin users were shown to have a 71 percent lower risk of developing dementia, according to a situation control research. A productive field of current study is the prevention of vascular dementia by risk factor treatments.

Clinical assessment:

Clinical evaluations for patients with vascular cognitive impairment aim to diagnose the condition and identify particular therapy targets for each patient (Figure no. 05).
Treatment of cognitive changes:

Only limited efficacy was discovered in two preliminary randomized controlled trials that looked at donepezil's effectiveness in treating vascular dementia (31, 32). A trial with gallantamine in individuals who had both Alzheimer's disease and cerebrovascular disease found minimal benefit overall (33), although benefit was shown in the subgroup with probable vascular dementia. Memantine's effects on vascular dementia have been investigated in two randomized controlled trials, and both found it to be only marginally effective. (34, 35)

The National Institute for Health and Clinical Excellence (NICE) does not recommend the use of memantine or other cholinesterase inhibitors for the signs and symptoms of vascular dementia because neither drug is approved for such a condition (National Institute for Health and Clinical Excellence 2011). Other medications, such as calcium channel blockers (such as nimodipine), nootropics (such as piracetam and citicoline), xanthenes (such as pentoxifylline), vasodilators, ergot derivatives, and antithrombotic agents, have been attempted for vascular dementia (for example ibuprofen, gingko). Most don't seem to be doing anything, and none are doing much more than modest things (36, 37)
Symptomatic treatment
Regardless of whether there is a causal relationship between depression and cognitive impairment, depression is a normal disease that needs to be treated. Vascular dementia is a growing issue, and while there are acceptable treatments for it, they may not be as successful in treating other types of depression (38). Dementia is especially susceptible to depression. As with any kind of dementia, patients and caregivers must have access to the right assistance and information. These appear to have a more positive impact on prosperity than currently available medications.

Control of vascular risk factors
There is no lack of possible areas of attention for the therapy of vascular cognitive impairment risk factors, but the evidence that slows the rate of illness progression is lacking. In individuals with hypertension who have no prior cerebrovascular disease, a Cochrane review failed to find convincing evidence that lowering blood pressure avoids a development of dementia or psychological impediment (39). Despite the Syst-Eur and PROGRESS studies showing modest but significant reductions in dementia from treating hypertension (40),

A few studies have failed to demonstrate a benefit of statins in the treatment of vascular dementia. According to Bowler(41), this may be due to the fact that hypertension is the most well-established treatable risk factor for vascular dementia and that cholesterol has little association with small vessel disease. Subcortical vascular subjective impedance is the most common form of vascular dementia disability. Most doctors would eventually consider it appropriate to treat vascular risk factors despite them.

Recommendations for future research:
Moving toward a comprehensive strategy for vascular dementia diagnosis, treatment, and prevention We believe that there are many takeaways from the above review of recent research on the role of vascular diseases related to the risk, course, evaluation, treatment, and conceptualization of disorders characterized by aging-related cognitive impairment decline history of disease like hypertension, stroke, diabetes, and hyperlipidemia, as well as modification of lifestyle. Therefore, we believe that more research is necessary on vascular dementia for the development of effective treatments and a healthy lifestyle.

a. Most dementias are occur with combinations of risk factors
In any cases, the readily available data demonstrates that the majority of dementia cases are characterized by a mixed phenotype, both throughout life and at the time of evaluation after death. The diseases associated with AD and vascular dementias are the most well-known co-occurring conditions. Following the post–mortem brain examination, aging-related diseases including hypertension, diabetes, obesity, hyperlipidemia, etc. are exacerbated while being accompanied with evidence of vascular dementia. Accordingly, it would seem to be more pertinent to focus research efforts on identifying the mechanisms through which vascular and neurodegenerative systems mutually contribute to the progression and movement of maturing-related cognitive disorders than to see them as separate illnesses.

b. Translational and implementation research
Clinical practice seldom changes quickly in response to research findings on the efficacy of a particular treatment (42). There are various separable components that contribute to this hole, and each call for specific techniques. (43) An ongoing study has shown that a 10% drop in the prevalence of major modifiable risk factors, including some of those mentioned in this article (such as diabetes, hypertension, and obesity), might significantly lower the rate of Alzheimer's disease (ADs) (44).

c. Applying rising standards, techniques, and discoveries of frameworks science and system prescription to utilize existing information and create models of disease forms that will prompt testable theories about the effect of intercessions for which adequate proof doesn’t yet exist
Given the level of interrelatedness among the frameworks embroiled in and affecting metabolic and vascular failure (45), a numerical biologic methodology can significantly educate the explanation regarding the important pathophysiologic processes that add to the movement of the sickness procedure after some time. For example, hypertension and T2DM are both distinguished before in the content as risk factors for vascular illness interceded cognitive disease; notwithstanding, hypertension is related with insulin resistance, which thusly is risk factor for T2DM. Correspondingly, obesity is a risk factor for both insulin resistance (and subsequently T2DM) and hypertension. A numerical biologic way to deal with evaluating the net effect of risk factors and their part
pathophyslogic components after some time would coordinate realized information utilizing measurable models of the dynamic and intelligent procedures required, just as recognizing regions where information are deficient and further research is required.

II. CONCLUSIONS

This review has focused on vascular dementia, its characteristics, risk factors, signs and symptoms, evaluation of vascular dementia, prevention and current treatment as well as recommendation for further research. Without this knowledge, we have so far been unable to identify a solution and are instead forced to rely only on symptomatic therapies that have little to no value for vascular dementia and This review articles are more helpful for knowing overall about the vascular dementia but briefly emphasis on the treatment aspect and recommendation of further research along with mention the evaluation parameter. In the future, it will be necessary to adopt a set of normative criteria for cognitive evaluation, including testing kinds and timing, and evaluation must include tests to gauge learning and memory as well as behavioural, motor, and emotional deficiencies.

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