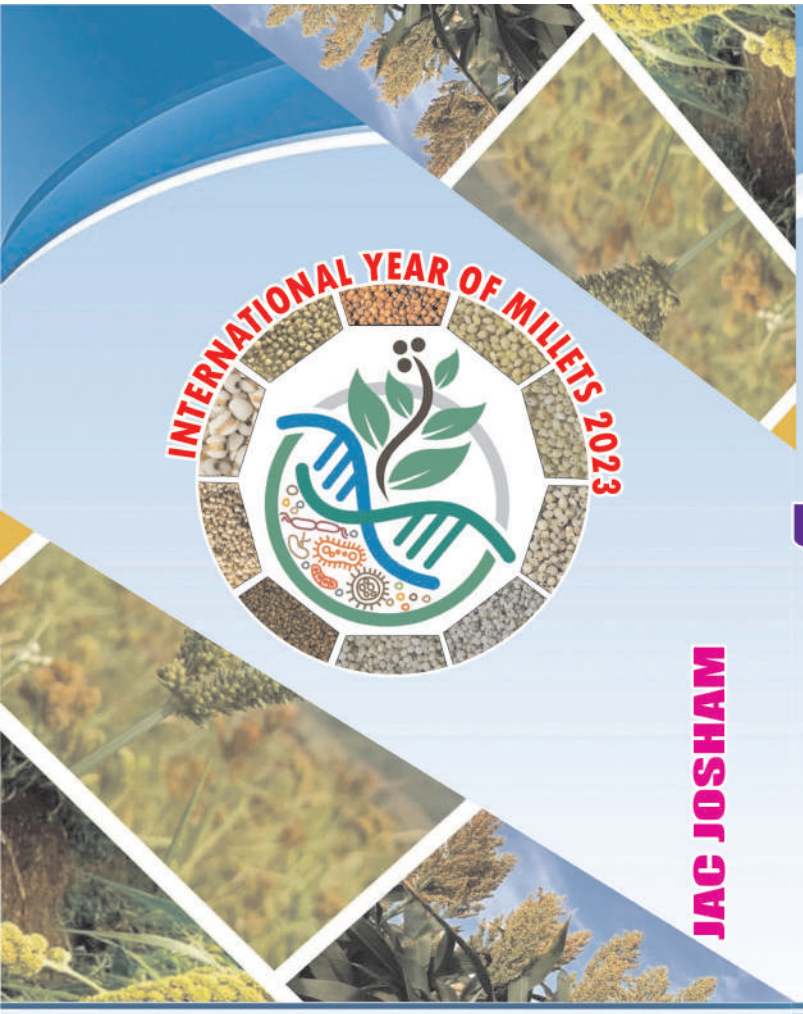

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THE PRINCIPLES OF HUMAN LIFE IN PURANANURU AND SIRPI'S POMES

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ஆய்வுச்சுருக்கம்

மனித வாழ்வியல் கோட்பாடுகள் மனித பண்புகளில் மிக முக்கியமான ஒன்றாகும். சங்க இலக்கியங்கள் காதல், அறம், மறம், ஈகை, கொடைச்சிறப்பு, ஆட்சிமுறைகள், விருந்தோம்பல், இல்லறப்பண்பு, போரின் நெறிமுறைகள், என பலவற்றை மனித வாழ்வியலின் முக்கிய கோட்பாடுகளாக எடுத்தியம்புகிறது. உலக மக்கள் ஒவ்வொருவரும் வாழ்வியல் கூறுகளைத் தன் வாழ்க்கையில் கொண்டு நற்பண்பு மிக்க மனிதர்களாக வாழ வழிகாட்டும் சங்க இலக்கியங்களுள் புறநானூறு முக்கிய பங்கு வகிக்கிறது. வாழ்வியல் கூறுகளுள் ஒன்றான விருந்தோம்பல் பண்பு ஒவ்வொருவரின் வாழ்வோடு இயைந்தும், இணைந்தும் உள்ளது. அறிமுகமாகாத ஒருவருக்கு விருந்தோம்பி மகிழும் பண்பு முதன்மையானதாகும். மனித வாழ்வியல் கோட்பாடுகளில் உயிரோடட்மானது அன்பு ஒன்றே, உன்னதமான இச்செயல் உலகில் வாழும் ஒவ்வொருவரிடமும் சகிப்புத்தன்மை, பரிவு, இரக்கம் என்ற உயரிய நற்பண்புகளைக் கற்றுக் கொடுக்கிறது. மனிதரின் மீது அக்கறை கொண்டு அவரை நெறிப்படுத்துவதும் பிற உயிர்களிடத்தில் பற்றும், நேயமும் கொண்டு அன்பு நிலையில் நம்மை இயங்க வைப்பதும் மனித நேயமாகும். ஒருத்திக்கு ஒருவன் என்ற கற்புக் கோட்பாட்டை சங்க இலக்கியங்களில் மகளிர் உயிரைக் காட்டிலும் சிறந்ததாய் மதித்து வாழ்ந்தமையைக் காணலாம். உலகில் உள்ள உயிர்களுக்கெல்லாம் உணவு, உடை, இருப்பிடம் என்ற அடிப்படைத் தேவைகளை அறிந்து உதவுவதே சிறந்த அறமாகும் என்பதையும் புறநானூறு எடுத்துரைக்கிறது. இத்தகைய கருத்தை வலியுறுத்தி கவிஞர் சிற்பி இன்றைய சமுதாயத்திற்கு தேவையான வாழ்வியல் கோட்பாடுகளை தன் கவிதைகளிலும் எடுத்துக்காட்டியுள்ளார். புறநானூற்றுக் கருத்தோடு சிற்பியின் கருத்தையும் ஆராய்வதே

இக்கட்டுரையின் நோக்கமாகும் என்பதை இவ்வாய்வுச் சுருக்கம் எடுத்துக்காட்டுகிறது.

கருச்சொற்கள் : அறம், மறம், ஈகை, கொடைச்சிறப்பு, விருந்தோம்பல், இல்லறப்பண்பு,

ABSTRACT

The Principles of human life are one of the most essential aspects of human characteristics . The sangam literature takes the main tenets of human life such as love ,virtue ,piety ,philanthropy ,hospitality and the ethics of war. Puranannuru plays on important role in sangam literature which guides the people of the world to live as virtuous people by incorporating the elements of life into their lives . As one of the elements of life ,hospitality has a running association with everyone's life. The puranannuru points out that the best virtue is to know and help all living beings in the world with their basic needs of food, clothing and shelter. This article emphasises this notion and seeks to evaluate and research the views of the poet Sirpi, who has also highlighted the principles of life necessary for today's society in his poems.

Keywords : love ,virtue ,piety ,philanthropy ,hospitality and the ethics of war

ஆய்வு முன்னுரை

மனித வாழ்வியல் கோட்பாடுகள் மனித பண்புகளில் மிக முக்கியமான ஒன்றாகும். மக்கள் பின்பற்றபட வேண்டிய உயரிய கோட்பாடுகளாக சங்க இலக்கியங்கள் பண்பாடு, நாகரிகம், பழக்கவழக்கங்கள், என பல்வேறு கோணங்களில் மனித வாழ்வியல் கோட்பாடுகளை வெளிப்படுத்துகின்றன. காதல், அறம், மறம், ஈகை, கொடைச்சிறப்பு, ஆட்சிமுறைகள், விருந்தோம்பல், இல்லறப்பண்பு, போரின் நெறிமுறைகள், என பலவற்றை மனித வாழ்வியலின் முக்கிய கோட்பாடுகளாக புறநானூறு எடுத்தியம்புகிறது. சங்ககாலப் புலவர்கள் நுண்ணறிவும், ஆழ்ந்த சிந்தனையும் மற்றும் மனிதப் பண்பும் கொண்டவர்களாகத் திகழ்ந்திருந்தனர் என்பதைச் சுட்டிக்காட்டுவதோடு, உலக மக்கள் அனைவரும் வாழ்வியல் பண்பாட்டுக் கூறுகளைத் தன் வாழ்வில் கொண்டு மனித மாண்பு மிக்கவர்களாக வாழ வழிகாட்டும் வாழ்வியல் நெறிமுறைகளைச் சுட்டிக்காட்டும் நூல்களுள் புறநானூறு தனி இடம் பிடித்துள்ளது. தமிழர்களின் வாழ்வியல் கருவூலமாகத் திகழும் புறநானூற்றுக் கருத்தை கவிஞர் சிற்பி தனது கவிதைகளில் மக்கள் பின்பற்றப்பட வேண்டிய வாழ்வியல் கோட்பாடுகளை எடுத்தாளும் முறையில் இக்கட்டுரை அமைந்துள்ளது.

விருந்தோம்பல் பண்பு

விருந்தோம்பல் பண்பு வாழ்வியல் கோட்பாடுகளுள் தலையாய கோட்பாடாகவும், தமிழரின் பண்பாட்டை வெளிக்காட்டும் முக்கிய கோட்பாடாகவும் விளங்குகிறது. மக்களின் வாழ்வோடு இயைந்தும், இணைந்தும் இப்பண்பு சிறந்து விளங்குகின்றது. அறிமுகமில்லாத ஒருவருக்கு விருந்தோம்பி மகிழக்கூடிய உயரிய எண்ணம் நம்மக்களுக்கே உரியது என சான்றோர் பலர் போற்றுகின்றனர். முதன்மையான இப்பண்பு கிராமப்புற மக்களிடம் மிளிர்வதைக் காணலாம். அம்மக்கள் இல்லத்திற்கு வரும் விருந்தினரை மன மகிழ்வோடு உபசரித்து வழியனுப்பும் பழக்கத்தை இன்றும் காணமுடிகிறது. தொன்று தொட்டு வாழையடி வாழையாக இருந்துவரும் இப்பழக்கத்தை சங்க இலக்கியங்களுள் ஒன்றான புறநானூறு அழகாக எடுத்துக் காட்டுகின்றது. தமக்கென வாழாது பிறருக்காக வாழ்தல் எளியோரிடத்தும் இனிமையாக பேசுவது, அயலாரை விருந்தோம்புவது, அமுதே கிடைப்பினும் பிறருக்கு கொடுத்து தாமும் உண்ணுவது, போன்ற உயரிய கோட்பாடே பண்பாடு மிக்கவரின் இயல்பாகும். இத்தகைய பண்பை இப்புறநானூற்றுப் பாடலடி எடுத்தியம்புகிறது.

“ ……. இந்திரர்
அமிழ்தம் இயைவ தாயினும் இனிதெனத்
தமியரும் உண்டலும் இலரே” (புறப்பாடல் - 182)

என்ற பாடலில் அமிழ்தமாயினும் தனித்து உண்ணாமையாகிய அறச்செயலைச் சுட்டிக்காட்டுவதோடு அமிழ்தமேயானாலும் தான் மட்டும் உண்ணுதல் கொள்ளற்க என்ற கருத்தை வலியுறுத்துகிறது.

கவிஞர் சிற்பி **‘மகிழ்ந்திட வா’** என்ற கவிதையில் சமைக்கும் விருந்தை உண்டு மகிழ்ந்திரு என்று கூறும் போது மகிழ்ச்சியின் அடையாளமான விருந்தின் முக்கியத்துவத்தை எடுத்துக்காட்டுகிறார்.

“நெய் மணக்கும் சோறு - இனிமை
நிறைந்த பழச் சாறு
பைங்கனி வாயித ழால் - கண்ணே!
பருகி மகிழ்ந்திட வா!” (நிலவுப் பூ - ப. 84)

என்ற கவிதை வரிகள் அன்போடு இனிமையாக சமைக்கும் உணவையும், பழச்சாற்றையும் உண்டு, பருகி மகிழ்ந்திடும் விருந்தோம்பல் பண்பை எடுத்துக்காட்டுகிறது.

மனித நேயம்

மனித நேயம் அன்புமயமானது. சகிப்புத்தன்மையும், பரிவும், இரக்கமும் கொண்டது. மனிதரின் மீது அக்கறை கொண்டு அவரை நெறிப்படுத்துவதும் பிற உயிர்களிடத்தில் பற்றும் நேயமும் கொண்டு அன்பு நிலையில் நம்மை இயங்கவைப்பது மனித நேயமாகும். **“ உன்னிடத்தில் நீ அன்பு கூர்வது போல உன் அயலாரிடத்தும் அன்பு கூர்வாயாக”-** என்ற இயேசு பெருமானின் கட்டளை மொழி இங்கு பொருத்திப் பார்க்கத்தக்கது. முறை வழுவாது நடுநிலை ஆய்ந்து குற்றவாளிகளுக்குரிய தகுந்த தண்டனையை அளிக்கும் திறம் படைத்தவன் சோழன் நெய்தலங் கானம் இளஞ்சேட் சென்னி திறமிக்க அவனைப் பணிந்து நின்றால் அவன் முன் குற்றத்தோடு நிற்பவர்களின் தண்டனையைக் குறைத்து முன்பை விட பேரன்புடன் நடந்து கொள்வான். என்று ஊன்பொதி பசுங்குடையார் குறிப்பிடுமிடத்து மன்னனின் மன்னிக்கும் மனிதநேயப் மாண்பு வெளிப்படுகிறது.

“வழிபடுவோரை வல்லறி தீயே
பிறர்பழி கூறுவோர் மொழிதே றலையே
நீ மெய் கண்ட தீமை காணின்
ஒப்ப நாடி அத்தக ஒறுத்தி
வந்து அடி பொருந்தி முந்தை நிற்பின்
தண்டமும் தணிதி பண்டையிற் பெரிதே” **(புறப்பாடல் - 10)**

என்ற புறப்பாட்டு அடிகள் மன்னிக்கும் மனிதநேயக் கோட்பாட்டை எடுத்துக்காட்டுகிறது. இக்கோட்பாட்டை தனது **நிலவுப்பூ** கவிதை வரிகளில் அழகாக எடுத்துக்காட்டுகிறார் கவிஞர் சிற்பி

“மன்னிக்க, எம் இறையே! அன்னோன் உன்னை
மதியாமற் போனதனால் கொடுமை செய்தேன்’
“தன்விழிகள் கீழ் நோக்க நடுந டுங்கித்
தலைவனிவை கூறிடவும், இறைவன் கேட்பான்
பன்னெடுநாள் நான் அவனைப் பொறுத்தேன் இன்னும்
பலப்பல நாள் அவன் திருந்தக் காத்திருப்பேன்;” **(நிலவுப்பூ - ப. 100)**

தவறு செய்பவர் மனம் திருந்தும் வரை இறைவன் காத்திருப்பார். பொறுத்து மன்னித்து காத்தருளுவார் என்பதை இப்பாடலடி உணர்த்துகிறது.

மனித நேயக்கருத்தை வாழ்வில் கொண்ட அன்னைத் தெரசாவின் மனித நேயப்பண்புகளை இக்கவிதை வரிகள் எடுத்துக்காட்டுகிறது.

"மனித நேயம் மிக்கவர்; மானுட
நலனுக்காய் தன்னை அர்ப்பணித்தவர்.
மக்கள் பணியே தனது இறைப்பணி
என கருதியவர், செயல்படுத்தியவர்." (புனிதர் அன்னைத் தெரேசா- ப. 9)

தொண்டு செய்து, தொண்டு செய்து கனிந்த கனி அவர்! அவர் வாழ்வும் பணியும், வருங்கால தலைமுறைக்கு வழிகாட்டும் ஒளிவிளக்கு! அதன் ஒளி மழையில் நனையும் போது இருண்ட உள்ளங்களில் இருளின் ஆட்சி தொலையும்; வறண்ட உள்ளங்களில் ஈரம் கசியும்! இத்தகைய கருணை வடிவம் கொண்ட அன்னைத் தெரேசா மானுட நலனுக்காய் தன்னை அர்ப்பணித்தவர். மக்கள் பணியே தனது இறைபணி எனக் கருதிச் செயல்பட்டவர். அவரின் மனித நேயம் உயிருடன் கலந்து மனிதரை வாழ வைக்கும் மனிதநேயக் கோட்பாட்டை தன் வாழ்நாள் முழுவதும் தன் வாழ்வில் கொண்டு செயல்பட்டவர்.

தன்மான உணர்வு

புலவர்கள் பெரும்பாலும் மன்னர்களின் ஆதரவால் வாழ்ந்தவர்கள் பெருநிலக்கிழவர்களாகிய வள்ளல்களைப் பாடி அவர்கள் வழங்கிய பொருள்களைக் கொண்டு வறுமை தீர்த்து வாழ்ந்தார்கள். இருப்பினும் தாங்கள் அறிவை, நேர்மையை யாருக்கும் அடகு வைத்துவிடவில்லை. உண்மையை உரைப்பதற்கு அஞ்சியதில்லை தன்மானத்துடனே தங்கள் வாழ்வை நடத்தி வந்தனர். இதனை புலவர் பெருஞ்சித்திரனார் கொடைத்தன்மையுடைய குமண மன்னனைப் பற்றி பாடியுள்ள பாடலின் வாயிலாக அறியலாம்.

"உயர்ந்து ஏந்து மருப்பின் கொல்களிறு பெறினும்
தவிர்ந்து விரு பரிசில் கொள்ளலென் உவந்து நீ
இன்புற விடுதி யாயின், சிறிது
குன்றியும் கொள்வல் கூர்வேல் குமண!" (புறப்பாடல் - 159)

சிறந்த உயர்ந்த தந்தங்களையுடைய ஆண் யானைகள் கிடைப்பினும் அன்பின்றிக் கிடைக்கும் அப்பரிசினை வாங்கிக்கொள்ள மாட்டேன். நீ மனம் உவந்து மகிழ்வுடன் கொடுக்கும் சிறிய குன்றி மணியளவுள்ள பொருளானாலும் பெற்றுக் கொள்வேன்.

குமணனே இதனை நீ உணர்ந்து கொள்வாயாக என்று பெருஞ்சித்திரனார் கூறுவதிலிருந்து அவரின் தன் மான உணர்வு புலப்படுகிறது. பெருந்தலைச்சாத்தனார் என்னும் மற்றொரு புலவர் கடிய நெடுவேட்டுவன் என்னும் குறுநில மன்னனிடம் பரிசில் வேண்டிச் சென்றார். பரிசிலை வழங்காது அவன் காலம் கடத்தினான். உடனே புலவர் அவன் வெட்கித் தலைகுணியும்படி தான் வேண்டி வந்த பரிசிலை வாங்க மறுத்த அச்செயல் புலவரின் தன்மான உணர்வை வெளிப்படுத்துகிறது.

“ முற்றிய திருவின் மூவர் ஆயினு
பெட்பின்றி ஈதல் யாம் வேண்டலமே” (புறப்பாடல் - 205)

என்ற பாடல் வரிகள் நிறைந்த செல்வமுடைய வேந்தர்களாகட்டும் அவர்கள் எம்மிடம் அன்பில்லாமலும், மதிப்பில்லாமலும் எவ்வளவு பொன்னையும், பொருளையும் கொடுத்தாலும் அதையாம் ஏற்க மாட்டோம் என்று புலவர் பெருந்தலைச்சாத்தனார் கூறுவதிலிருந்து பரிசில் வேண்டிச்செல்லும் புலவரின் தன்மான உணர்வினை இப்புறநானூற்றுப் பாடல் அடிகள் உணர்த்துகிறது. ஒவ்வொருவரின் மனவுணர்வை சீண்டிப்பார்க்கும் போது தன்மான உணர்வு தலைத்தோங்கி சுயமரியாதை காப்பாற்றப்படுகிறது.

தாழ்த்தப்பட்ட மக்களின் தன்மானத்தை தட்டிப்பார்க்கும் போது வீறு கொண்டு எழுவது ஒவ்வொரு தனிமனித உணர்வாகும் என்பதை கவிஞர் சிற்பி தன் கவிதைகளில் சுட்டிக்காட்டுகிறார்.

‘ **“இல்லீங்க எங்க அருக்காணிக்கு நேத்து**
நீங்கதான் புருசனாய்டீங்க
நாம் தான் உறவாயிட்டோம்
அதனாலே ஒங்க மக காமாட்சியை
எங்க சின்னானுக்குப் பொண்ணு கேக்க வந்திருக்கோம்”

(சர்ப்பயாகம் - ப. 350)

என்ற கவிதை வரிகளில் சமுதாயத்தில் தாழ்த்தப்பட்ட மக்களைத் தட்டிப்பார்க்கும் போது அவர்கள் வீறு கொண்டு எழுந்தால் இச்சமுதாயத்தின் நிலை என்னவாகும் என்பதைக் இக்கவிதை வரிகள் சுட்டிக்காட்டுகிறது.

ஒற்றுமைப்பண்பு

சங்ககால மக்கள் ஒருவரை ஒருவர் விட்டுக்கொடுக்காது மதித்து வாழும்

பெருமை உடையவர்களாக வாழ்ந்தனர் என்பதற்கு அக்காலகட்டத்தில் வாழ்ந்த மக்கள் மட்டுமல்ல புலவர்களும் எடுத்துக்காட்டாய் திகழ்ந்தனர். **"ஒற்றுமையே வலிமை, ஒன்றுபட்டால் உண்டு வாழ்வு, ஒற்றுமையின்றேல் அனைவருக்கும் தாழ்வே"** என்ற உயரிய கொள்கைகளை நம் வாழ்வில் கொண்டு வாழவேண்டும். இத்தகைய உயரிய கொள்கைகளை வாழ்வில் கொண்ட பெருஞ்சித்திரனார் முதிரை தலைவன் குமண மன்னனிடம் சென்று கடையெழு வள்ளல்கள் மாய்ந்த பின் அனைவரும் தாங்கிய ஈகை குணத்தை அவன் ஒருவனே தாங்கியதாக இப்பாடல் வரிகள் உணர்த்துகிறது.

"எழுவர் மாய்ந்த பின்றை அழி வரப்
பாடி வருநரும் பிறருங் கூடி
இரந்தோர் அற்றம் தீர்க்கென என விரைந்து இவண்
உள்ளி வந்தனென் யானே" - (புறப்பாடல் - 158)

முதிர மலையின் தலைவனான குமண மன்னன் பெரும்புகழ் விளங்கும் ஈகைத் தன்மை சிறப்புற்று விளங்குபவன். அவன் ஆளும் அந்நாட்டில் வாழும் ஐந்தறிவு உயிர்களும் பிறருக்கு கொடுத்து வாழும் மனம் படைத்தவை என்பதை சுவைமிக்க பலாக் கனியைக் கண்ட ஆண் குரங்கு தான் உண்பதோடு பெண் குரங்கையும் கையசைத்து அழைக்கிறது என்ற கருத்தைக் கூறும் போது அவைகளிடமும் ஒற்றுமைப் பண்பு வெளிப்படுகிறது.

சோழ மன்னனிடம் நீ சூடியுள்ள மாலை ஆத்திப் பூவால் ஆனது உன்னோடு போர் செய்பவன் மாலையும் ஆத்திப் பூவால் ஆனது ஒருவர் தோற்பினும் உமது குலம் அல்லவா தோற்றது எனவாகும். ஆகவே போரில் இருவரும் வெற்றி பெறுவது என்பது இயல்பு அல்ல. ஒரே குலத்தில் தோன்றியவர்கள் ஒற்றுமையோடு வாழ்வதை விடுத்துப் பகைகெண்டு போர் செய்தால் பிறரால் ஏளனமாகக் கருதப்படுவீர்கள் என்பதை இப்புறப்பாடல் வரிகள் எடுத்துக்காட்டுகிறது.

"நின்ன கண்ணியும் ஆர்மிடைந்தன்றே நின்னொடு
பொருவோன் கண்ணியும் ஆர்மிடைந்து அன்றே
ஒருவீர் தோற்பினும் தோற்பது நும்குடியே
இருவீர் வேறல் இயற்கையும் அன்றே" (புறப்பாடல் - 45)

இப்பாடல் அடிகள் வாழ்வியல் கோட்பாடுகளுள் முக்கிய கோட்பாடாக ஒற்றுமையின் உயர்ந்த பண்பை எடுத்துக்காட்டுகிறது.

மூதாதையார் வகுத்த ஒற்றுமையை உணர்வை எண்ணி உள்ளம் மகிழ்ந்தேன்

என்று கவிஞர் சிற்பி கூறும் போது அவர் சமுதாயத்திற்குச் சுட்டிக்காட்டும் ஒற்றுமைப் பண்பு வெளிப்படுகிறது.

"என் தமிழர் மூதாதை ஏற்றமைத்த ஒற்றுமையின்
சின்னங்கள் கண்டேன்நான்; சிந்தை குளிர்ந்திட்டேன்
கங்கை நதிப் பொருளும் காழகத்தின் நற்பயனும்
பொங்கும் உரோமின் புதுநறவும் தாம்மயங்கச்
சங்கத் துறை முன்னே சூழ்ந்திருக்க நான் கண்டேன்;"

(சிரித்த முத்துக்கள் - ப. 124)

தமிழர் மூதாதையர் கட்டி அமைத்த ஒற்றுமையின் வலிமையை தன் கவிதைகளில் பொருள் நயத்தோடு எடுத்தாளுகிறார் கவிஞர் சிற்பி.

ஒழுக்கப்பண்பு

ஒழுக்கம் இல்லை என்றால் வீடு மட்டுமல்ல நாடே கெட்டுச் சீரழிந்து விடும் என்பது நாம் அனைவரும் அறிந்த ஒன்று. இதனை தெய்வப்புலவர் இதற்கென்று ஒரு தனி அதிகாரத்தை வகுத்துள்ளார். ஒழுக்கம் தான் ஒவ்வொரு மனிதனும் வாழ்விலும் உயர்ந்த கோட்பாடாகக் கொண்டு வாழவேண்டும். என்பதை புறநானூற்றுப் பாடலடிகள் எடுத்தியம்புகிறது.

"நாடா கொன்றோ காடா கொன்றோ
அவலா கொன்றோ மிசையா கொன்றோ
எவ்வழி நல்லவர் ஆடவர்
அவ்வழி நல்லவை வாழிய நிலனே" - (புறப்பாடல் - 187)

நாடாக இருந்தாலும், காடாக இருந்தாலும், தாழ்ந்த நிலமாக, பள்ளமாக இருந்தாலும், மேடான நிலமாக இருந்தாலும், எவ்விடத்தில் ஆடவர் நல்லவராய் விளங்குகின்றனரோ அந்நிலம் மேன்மை பெற்று திகழ்கிறது. அந்நிலமும் சிறப்புடையதாகக் கருதப்படுகிறது. வீரம் விளையும் இந்நிலத்தில் மக்கட்பண்பினால் குறிப்பாக ஆடவர் ஒழுக்கப் பண்பினால் அந்நிலம் மேன்மையடையும். வீட்டிற்கு பெண்ணும், நாட்டிற்கு ஆணும் என சமூகம் அமைந்த காலகட்டத்தில் ஆடவர் ஒழுக்கமே உலக மேன்மைக்கு அடிப்படை என்பதை புறநானூற்றுப் பாடல் சுட்டிக்காட்டுகிறது.

துஷ்யந்தன் சகுந்தலைக்கு அளித்த மோதிரத்தை தொலைத்ததால் அவள் தன் மகனுடன் காட்டில் கஷ்டப்பட்டாள். ஆனால் இன்றைய சகுந்தலைகள் மோதிரத்தை

அல்ல தனக்குப் பொருந்தாத காதலர்களையே தூக்கி எறிகிறார்கள் என்று கவிஞர் சுட்டும் போது ஒவ்வொரு பெண்ணும் தன் ஒழுக்கத்தினை மேன்மையாகக் கொண்டு மதித்து வாழ்கிறார்கள் என்பதை கவிஞர் தன் கவிதை வரிகளில் புலப்படுகிறார்.

"விசுவ எத்தர்களும்
துரோக துஷ்டந்தர்களும்
இன்னும் எங்களில் இருக்கின்றார்கள்
ஆனால் எமது சகுந்தலைகள்
இப்போது தொலைப்பது
மோதிரங்களை அல்ல! – பொருந்தாத
காதலரை!" - **(சர்ப்பயாகம் - ப. 312)**

கல்வியின் சிறப்பு

உலகிலுள்ள மக்கள் அனைவருக்கும் அணிகலனாகத் திகழ்வது கல்வியே. கல்வியறிவு இல்லாத மக்கள் களர்நிலம் போன்றவர்கள். நாம் செய்யும் அலங்காரமும், உடம்பில் அணியும் அணிகலன்கள் நமக்கு அழகு சேர்ப்பன அல்ல. பயிலும் கல்வியே உண்மையான அழகு என்றும் பிச்சை எடுத்தாயினும் கற்றல் நன்று சாலச் சிறந்தது. என நாலடியார் வலியுறுத்தும் கருத்துக்கள் போற்றுதற்குரியது. உலகப் பொதுமறையும் தனி அதிகாரம் வகுத்துள்ளது. வாழ்வியல் கருவூலமான இப்புறநூல் இக்கருத்தை மேலும் வலுவூட்டுகிறது.

"உற்றுழி உதவியும் உறுபொருள் கொடுத்தும்
பிற்றைநிலை முனியாது கற்றல் நன்றே" - **(புறப்பாடல் - 183)**

என்ற பாடல் அடிகள் தமக்கு கல்வி புகட்டும் ஆசிரியருக்கு உரிய வகையில் உதவியைக் செய்து துணை புரிந்தும், வாழ்க்கைக்குத் தேவையான பொருட் செல்வத்தை அளித்தும், வழிபடு நிலையிலிருந்து தவறுதல் இன்றி கல்வியைக் கற்பது நன்மையுடையது. கல்வியின் சிறப்பினை நன்கு உரைத்து உலகோர் சிறந்த அறிவுடையவராக விளங்க வேண்டும் என்ற கருத்தை நிலை நிறுத்துகிறது இப்புறப்பாட்டு நூல். இதே கருத்தை சிற்பியின் கவிதை வரிகளும் எடுத்துக்காட்டுகிறது.

"நூலறிவும் இயற்கை
நுண்ணறிவும் உலகியலின்
கால நிலையறிவும்
கருவித் துணையறிவும்" - **(சிரித்தமுத்துகள் - ப. 203)**

நூலறிவு, நுண்ணறிவு, மனப்பாட அறிவு, காலநிலையறிவு, கருவியின் துணையறிவு ஒரு மனிதனை எவ்வாறு உயர்த்துகிறது என்பதை கவிஞரின் பாடல் வரிகள் விளக்குகிறது.

கற்பின் மாண்பு

ஒருத்திக்கு ஒருவன் என்ற கற்புக் கோட்பாட்டில் சங்க இலக்கியங்களில் மகளிர் உயிரைக் காட்டிலும் சிறந்ததாய் நாணத்தையும், நாணத்தைக் காட்டிலும் சிறந்ததாய் கற்பையும் மதித்து வாழ்ந்தமையைக் காணலாம். மேலும் சங்க கால மகளிர் அருந்ததிக்கு ஒக்கும் சிறப்புடைய கற்புடையவராய் வாழ்ந்தமையைச் சுட்டிக்காட்டுகிறது. கற்பின் மேன்மையை குடிமக்கள் காப்பியமான சிலப்பதிகாரம் கற்பின் பெருமையை எடுத்துக்காட்டுகிறது. இன்னும் பல சான்றுகளை சங்க இலக்கியங்கள் எடுத்தியம்புகின்றன.

"வடமீன் புரையும் கற்பின் மடமொழி" (புறப்பாடல் - 122)

என்ற பாடல் வரி கற்பின் மாண்பை எடுத்துக்காட்டுகிறது. தனது கற்பிற்கும், மானத்திற்கும் களங்கம் ஏற்படும் போது களங்கத்தை துச்சமாய் கருதி துணிச்சலாய் எதிர் கொண்டு போராடி வெற்றி கொள்ளும் பெண்களின் ஒழுக்க நெறியை உயர்த்திக் காட்டியுள்ளார் கவிஞர் சிற்பி.

"தனது கற்புக்கு மானத்துக்கு
விளையும் களங்கத்தைக்
துச்சமாய்க் கருதி
துணிச்சலாய்ச் சாட்சிசொல்லி" (சார்ப்பயாகம் - ப. 317)

வீர மாண்புகள்

ஒரு சிறந்த வீரன் மார்பில் விழுப்புண்பட்டு இறப்பதே சிறப்பு. அதனை விடுத்து போரில் புறமுதுகிட்டு வீழ்வது மிகவும் கேவலமாகக் கருதப்பட்ட சூழலில் பகைவரின் போருக்கு அஞ்சி உன் மகன் புறமுதுகிட்டு இறந்து விட்டான் என பிறர் சொல்லக் கேட்டவள் தன் மகன் இறந்துவிட்டான் என்ற செய்தியைக் கேட்டு கலங்காது அவன் புறமுதுகிட்டு வீழ்ந்தான் என்பதைத் தாங்கிக் கொள்ள முடியாத தாய் வேதனையோடு சூளுரைக்கிறாள்.

"படையழிந்த மாறினன் என்று பலர் கூற
மண்டு அமர்க்கு உடைந்தனன் ஆயின் உண்ட என்
முலை அறுத்திடுவென் யான் எனச் சினை" (புறப்பாடல் - 278)

எனக் காக்கைப் பாடினியார் பாடல் மூலம் தன் புதல்வன் புறமுதுகிட்டுப் போர் களத்திலிருந்து ஓடிப் போனான் என்ற செய்தியைப் பலர் கூறக்கேட்டு வீரத்தாய் வேதனையடைந்தாள். உடனே கையில் வாள் ஏந்தியவளாகிப் போர்களத்தை அடைந்து தான் பெற்ற மகன் புறங் கொடுத்து சென்றவனாயின் அவனுக்குப் பால்கொடுத்த என் மார்பகத்தை அறுத்தெறிவேன் என்று வஞ்சினம் கூறினாள். புறநானூற்றுப் பாடல் உணர்த்தும் இக்கருத்து வாழ்வியல் கோட்பாட்டை எடுத்தியம்புகிறது. புறப்பாட்டு உணர்த்தும் கருத்தை உள்வாங்கிய கவிஞர் தன் கவிதையில் வீரவுணர்வை எடுத்துக்காட்டுகிறார்.

" அஞ்சிக் கிடப்பது நஞ்சென் றிளைஞர்கள்
ஆண்மை தழைய வைத்தான் - எங்கும்
கேண்மை இழைய வைத்தான்!"

(சிற்பியின் கவிதைகள் - நிலவுப்பூ ப. 32)

அஞ்சி வாழ்வது நஞ்சென்று எண்ணி வீரவுணர்வோடு வாழவேண்டும் என்பதைக் கவிஞர் சுட்டிக்காட்டுகிறார்.

"பொனனார்ந்த தமிழ்மகளே! உனதருமைச் செல்வன்
புகழ்மிகுத்த விழிமூடிப் போகின்ற வேளை
உன்னுதிரம் கண்ணீராய் உதிர்த்தாயோ, அம்மா!
உரம்வாய்ந்த தமிழ்மறவன் உடலத்தைக் கையால்
அன்னாய்நீ வாரியெடுத் தணைத்தாயோ, தாயே!"

(சிரித்தமுத்துக்கள் - ப. 131)

வீரத்தில் புகழ் மிக்க அருமைப் புதல்வன் மண்ணில் விழிமூடி மடிகின்ற நேரம் கண்ணீரை உதிரமாய் உதிர்த்த தாயின் உணர்வு வெளிப்படுகிறது. நெஞ்சில் உறுதியுள்ள தமிழ்மறவனின் உடலைக் கையால் வாரியெடுத்து அணைக்கின்ற தாயின் வீரமாண்பையும் கவிஞர் சிற்பி சுட்டிக்காட்டுகிறார்.

முடிவுரை

இன்றைய சமுதாயததிற்கு தமிழர்களின் கருவூலமாய்த் திகழும் புறநானூறு எடுத்துரைக்கும் அறக்கருத்துக்கள் மிகவும் ஏற்புடையதாக இருக்கும். புத்துணர்வும் புதுவாழ்வும் பெறத்துடிக்கும் தமிழ் மக்களுக்கு இந்நூல் ஓர் ஒப்பற்ற அறிவுச்சுரங்கம். புறநானூற்றுக்காலச் சமுதாயத்தில் வாழ்ந்த மக்களின் மனித மாண்புகள்

போற்றுதலுக்குரியது. அந்நூல் உணர்த்தும் முக்கியப் பண்புகளைக் கடைபிடித்து நெற்பிறழாமல் வாழ்ந்து வந்த காரணத்தால் சங்க கால மக்கள் முதன்மையானவர்களாகத் திகழ்ந்தார்கள். அவர்களிடம் கல்வி, அறம், மறம், கொடை, கற்பு, ஒழுக்கம், விருந்தோம்பல் போன்ற முக்கிய பண்புகள் மேலோங்கி இருந்தன என்பதைப் புறநானூற்றுப் பாடல் அடிகள் உணர்த்தும் கருத்தை கவிஞர் சிற்பியும் தனது கவிதைகளில் எடுத்துக்காட்டியுள்ளார்.

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POPULATION POLICY IN THE POST –INDEPENDENT PERIOD AND ITS IMPACT ON WOMEN HEALTH

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ABSTRACT

People in general and women in particular are torn between the indigenous and allopathic systems. In the case of common and frequent ailments due to time and financial constrains locale medicine is invariably tried. Seeking allopathy treatment is still not very common in rural India. In the name of modernisation and globalisation modern medicine is being thrust on the people and some of the traditional healing techniques which had been passed on over generations by women has witnessed a sudden death. This paper highlights the population policies that are being administered by the Government of India and its impact on women health

Keywords: Women Health, Mental Health, Population, Fertility, Infertility

INTRODUCTION

The new approach is being projected as client centred, demand driven and of high quality the inadequacy of resources and shortage of skilled medical personnel pose challenges of a very high magnitude. Another worrying phenomenon is the mind set of medical functionaries and program managers. Being a democracy, India has institutional obstacles as well as lack of continuity within the government and lack of commitment on the part of the bureaucracy. Moreover, it is very doubtful whether the providers have understood the concept of reproductive health itself properly or not. With the existing infrastructure, technology and professional competence whether services relating to reproductive tract infections and sexually transmitted diseases can be provided effectively is doubtful. Whether the unmet demand for contraceptives

could fully be met is also doubtful. Male methods are yet to become popular and also not readily available in view of the overemphasis laid on female sterilisation. In the past sterilisation were performed in camps with least care for infection prevention. No efforts were taken to provide follow up service or counselling. Thus, the critics are of the view that the drastic change in population policy is hasty without allowing time for increase in infrastructure and change in perception or mind set of the concerned medical administrative personnel.

MENTAL HEALTH OF WOMEN

In India, mental health is not viewed as problem at all. The need for maintaining good mental has hardly been recognized . The role of 'housewife' and 'motherhood' has been associated with high levels of distress mainly because they are highly demanding. Coupled with this is the feeling of helplessness since the lack authority, autonomy and bargaining power Inspite of their best contribution to the development of the family. Thus, women are subjected to lot of stress and strain. In the case of working women, women's outside career causes friction in the home and women are overburdened especially if the domestic chores are not shared by other members in the family.[1] Discrimination, harassment and threat of violence by the superiors or male colleagues at the work place contribute further to the misery of women. These sociological factors are often ignored and the depression suffered by them is conveniently attributed to their menstrual cycle and physiology. While economic and social compulsions have brought many women to the world of paid work and raised their aspirations and expectations, societal attitude is not at all responsive to their changing roles. A survey conducted among 500 working women in Delhi by Hamara Parivar, a family welfare programme reveals that 78% the respondents suffered some depression due to sociological pressures and breakdown of personal relationship.

WOMEN AND HIV

At the end of 1999, 34.3 million people worldwide were living with HIV/AIDS –

15.7 million were women up from 12.1 million in 1997. Women were more than 40% of the 5.4 million people infected in 1999 alone. The higher incidence of HIV infection among girls and women is necessarily linked to the gender power relations.[2] The inability of women in insist on safe sex practices by their male partners and the economic power enjoyed by the male. This is to be viewed in the context of the biologically easier male to female transmission of the HIV virus and non-availability of a contraceptive which women can use to protect themselves without expecting the male to use the condom. HIV among women is not only a health issue but also an economic and development issue. Women's role as mothers, caregivers and wage earners are affected by this disease[2]. It also has tremendous impact on future rates on infant, child and maternal mortality, life expectancy and economic growth. Many women with HIV/AIDS become infertile or die before the end of their reproductive years. Moreover, AIDS epidemic has left 13.2 million orphans threatening the very family structure which is the foundation for the social fabric at large. In India, 1 and every 3300 children under 15 years of age had lost his/her mother or both parents to AIDS. The cumulative number of reported cases of death due to AIDS in the country as reported to the National AIDS Control Organisation up to 31st December 2000 was 1722. Based on the available data from the nationwide sentinel surveillance an estimated 3.7 million people are infected with HIV in the country as of 1999.

HEALTH ADMINISTRATION

Women feel bad if attended by male health provides. Very few lady doctors are available in the rural areas and hence women are hesitant to seek health care. In reproductive health almost all the contraceptives are provider controlled rather than user controlled (sterilisation, IUD's, implants, injectable). They are at the mercy of doctors. The health care policy is still very silent on reproductive tract infections suffered by nearly 40% of the women of developing countries.[3] The domestic violence suffered by them, the rising incidence of cancer and occupational diseases. The insensitivity of the

community at large to the air pollution problem suffered by poor women in the kitchen is a classic example. In view of the multiple jobs performed by women, the stress levels suffered by them are on the increase. Unfortunately, mental health assumes least priority in our health care system. Even research studies are highly biased. The higher rates of depression among women are attributed to their biology that is menstruation, pregnancy and menopause rather than to the social, economic, political, cultural discrimination suffered by them. It is the humiliation suffered by women in the hands of men at home, workplace and community which cause depression and medical research fails to analyse the impact of these factors on the mental health of women.

To top it all, the health data is not disaggregated by sex. Another moot question is reliability of such data. In societies where gender biases exist in health seeking behaviour female morbidity data can be underestimate[4]. Health researchers are of view that health problems that affect men.[4] The only exception is contraceptive research. Moreover, the inadequacy and failures of the public health system in India have driven people to seek health care from private health care providers. Indiscriminate privatisation is likely to accentuate the misery of the poor especially the women of poorer families.

ADULT WOMEN

Many of the ageing women suffer from gastroenteritis, hypertension, arthritis, diabetes and asthma. The medical system has failed to address the specific health problems of elder women such as arthritis, osteoporosis, cancers, malnutrition and anxiety syndromes due to loneliness. Since they are economically dependent and their mobility is highly restricted due to their age, they suffer neglect and no follow up in cases of prolonged treatment. Even if they do not have any disease they are overburdened with domestic chores. While there is a specific retirement age for men, women are forced to attend to kitchen work and child care till their death.

INFERTILITY

In the case of infertility of couples in almost are social strata the blame is squarely on the women. The new reproductive technologies force women to undergo various tests and suffer tensions anxiety and repeated visits to hospitals.[5] Adoption was the recourse some time back but with the introduction of NRTs there is never ending pressure on the women to try them with least regard to their physical discomfort and mental health.

WOMEN HEALTH

India's Family Welfare Program (Family Planning Program as it was known earlier) is the oldest government sponsored fertility reduction programme in the world. Since its inception the programme has undergone quantitative and qualitative changes. Till late 1960s the programme objective was one of provision of maternal and child care benefits to expectant mothers. The approach was one of provision of maternal and child health care and not fertility reduction. But with the passage of time when growing population was found to be a threat to economic development, the thrust of the programme changed. Method specific targets were introduced during 1969 – 1974 with the goal of achieving a contraceptive prevalence rate of 60% and a net reproductive rate of one by the end of the fourth plan. At the national level, numerical targets for each contraceptive method worked out and these targets were apportioned among states and then among districts. Even individual field staff of several government departments was assigned annual monthly targets for each contraceptive method.[6] The system of cash award for best performance encouraged the states to inflate the performance figures. During the emergency the family planning programme received the highest priority from Sanjay Gandhi the extra constitutional authority of that time. In view of the mass sterilizations performed, the harassment of the general masses, by government officials and the least care evinced by health personnel to the quality of service, the program not only suffered a severe setback but also removed Indira Gandhi from power. The fatal

flaws committed on the population policy front caused the exit of the Indira Gandhi government. So, after 1977, general elections when the Janata Party came to power it wanted to play safe and hence renamed the program from one of family planning to Family Welfare Program. In spite of an effort to integrate family planning with health, the demographically driven goals of reducing the birth rate and the population growth rate continued to dominate the program's monitoring and assessment. The achievements were exhibited as sterilizations performed, couple protection rate and birth averted. Thus, the focus was still on population reduction and not holistic family health care as the name family welfare implied.

FAMILY WELFARE PROGRAM

The child survival and safe motherhood program was implemented in 1992 which broadened the scope of family welfare program. Besides meeting the health needs of the mother and child it provided services for birth spacing and limiting. By the differential performance by the different states and the continued high maternal mortality rate and infant mortality rate in certain states created doubts on the efficacy of the family welfare program and its implementation strategy. Moreover, in view of the ICPD Cairo the internal efforts taken to review the working of the family welfare program provided an opportunity for introspection and reflection. The Swaminathan Committee formed by the National Development Council suggested for the removal of contraceptive targets and recommended radical changes in programme administration. Though the Government of India did not accept all the recommendations it passed a constitutional amendment in 1993 which shifted the control of the health and family welfare program to the local governments. The Cairo Conference brought about a radical change in the outlook of government. In 1997 the government of India finally abolished demographic contraceptive targets and removed provider incentives. In its place the community needs assessment approach for planning and monitoring reproductive and child health services was introduced. The idea was to translate the

ICPD concepts of reproductive rights into action by introducing a more comprehensive package of reproductive health services giving women access to information at a role in program management. Accordingly, the new indicators to assess the impact of family welfare program focus their attention on the needs of the people rather than the needs of the government, stress the quality aspect rather than the quantitative achievement and involvement of women in health care provision. Thus, under the new approach evaluation will be linked to increases in utilization of services and decreases in infant and maternal mortality rates[7].

There is no doubt that universal awareness on contraceptives even among the poor and downtrodden would not have been possible but for the huge program given by the public health sector. But the other side of the coin is also equally weighty so as to undermine the success of the programme. The whole family welfare program subordinated women's health interests to the general societal objective of population control.

POPULATION REDUCTION

While everybody agreed on the need for population reduction in the Indian context the way it was implemented came in for criticism. The targets for birth control were set by the central ministry without considering local realities and ruthlessly thrust on the functionaries for achievement. This led to widespread discontent among people. Mass sterilisation camps created a fear and retaliatory attitude in the minds of the people. The very fact that the allocations for family planning shot up from Rs. 6.5 million in the first plan to a colossal 10,000 times increase to 65000 million in the eighth plan speaks of the importance given to this program. This was so in spite of a decline in health sector expenditures from 3.3% in the fifth plan to 1.74% in the eighth plan. Till 1990's population policy was viewed solely as a fertility reduction policy. Other factors like female education, employment and livelihood strategies for women and women's status in general which have a bearing on fertility were paid least

attention. Instead of adopting a multi prolonged strategy to enable women to achieve their reproductive goals and help women to have increased control over resources, it chose to advise women as to how many children they should have. The developmental programmes cared little to change the attitude of the society from one of son-mania to equal preference for girls and boys. Instead of working via girl education and women employment to alter the existing power structure, instead of working more on reduction in maternal mortality and infant mortality to obviate the necessity of having a large family the government opted to work only on one goal direct reduction of population through sterilisation again relying heavily on terminal methods rather than on temporary methods. With the change in government outlook after the Cairo conference it is hoped that the new population policy 2000 will be one of concern for women to meet their personal reproductive goals, addressing the question of unplanned and unwanted child bearing rather than avoidance of all births.[7]

CONCLUSION

As a matter of fact , much has been achieved in the health sector. But gender issues have hardly been paid any attention. Women's health is identified only with maternal health as if women do not suffer any other disease. Even in maternal health, the societal objective of population control was the key concern rather than women's health. The demographic objectives shaped women's health policy till the Cairo Conference. The population policy 2000 stresses on women's reproductive rights which is a good beginning. But what is required is contextualizing women's health in the general frame work of women's subordination and address the root causes of gender inequality in health care. It is a pity that the system does not locate the health problems of women in the general context of oppressive man-woman relations. The effect of gender division of labour on women's health (women are often over-burdened with unpaid, unrecognised domestic work) and the societal view of treating women as child bearing machines and the domestic and communal violence which they are subjected

to, are often ignored. Women's health is not viewed in a holistic perspective. Gender and poverty cause havoc to women's health. This is also conveniently forgotten. Engendering health policy is the only answer if the inequity is to be rectified.

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REVIEWER REMARKS

1. Full details about 'Darvar (1999)' should be given in Reference Section
2. End Note numbers should be given in the body of the paper in series
3. Title of the paper is modified by the Reviewer in relation to the contents Fulfilling these suggestions the paper can be published.

STUDY ON STRESS MANAGEMENT AMONG WORKING WOMEN WITH REFERENCE TO THENI

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ABSTRACT

Stress is a response which takes place in the individual because of a feeling of emotional or physical tension. It occurs to anyone because of any event or thought that makes them feel frustrated, Angry or nervous. Now a days we are in Technological Era facing many problems that leads to stress. In particularly women are facing many challenges in their life. Our Indian culture bestows on women as the caretaker of the family. But the current generation of women, who wants to go after their dream career also. Women in India belong to any class entered into various professions which leads to stress in their personal as well as professional life. Increasing work pressure, financial needs and recent technology, Work place culture, job insecurity are some factors that increase stress among women. This paper aims to examine the factors that cause Stress and also to find coping strategies they follow to manage their stress among working women with reference to Theni.

Key Words: Stress, working women, Factors causing Stress, Coping strategies

INTRODUCTION

Our world is a place made where human has to live and lead a peaceful life but now the world has become stress and depression, but today the world has become a place where stress and depression go holding hands in the place of work and it has spread in to the generation that even young people are a part of it. Stress is a wide

experience as it gives the impression to have universal spread. Stress exists not only human beings but also in animals and even in metals.

Technology affects almost every aspect of 21st century life where everyone is attempting to excel in his/her field whether it may be at home or work place. From the time when the turn of the century, the status of Indian women has been changing due to rapid changes in industrialization, urbanization, spatial mobility and social legislation. With the advancement in education and awareness, women have shifted from kitchen to higher level of professional activities. This induced the women to be excelling in various fields which automatically create the stress in women because she plays a dual role as housewife, mother in home and employee in various institutions. Researches shows that women are affected more by stress than Men .

A stressor can be either positive or negative on the basis of how person respond. For example, one person may view stressor as a motivator, whereas another person may identify it as a obstruction. Stress can be positive or negative. Positive stress is known as estruses and negative stress as distress. Distress affects physical and mental well-being of a person. Estruses trigger the body and mind to perform creatively. Distress has a negative stress which affects the mental composure of a person. Some of these problems are insomnia, eating disorders, heart problems, and suicidal tendencies. Devoid of stress, a person becomes sluggish and boring. Positive stress encourages a person to achieve better. However, if this stress exceeds beyond the required level it causes distress. The perception of stress varies among individuals and they have their own stress endurance as some tend to work better under pressure, while the others cannot bear "last minute syndrome".

REVIEW OF LITERATURE

Iwasaki etal., 2004 had found in their studies that most of the women have an increased level of stress, anxiety and all the related disorders overdue to their additional responsibilities that occur due to gender roles.

Paterson (1978) had mentioned that the working women playing dual role that created conflicting situations among them.

Benjamin Rozario and Krishnakumar (2014) examined that the person affected by stress due to both professional and personal causes. He also revealed in his study that the pressures of the persons include work load and work life balances.

Stephen Palmer and Kristina Gyllensten (2005) had mentioned in their study that Multi-faceted roles,absence of career advancement, favoritism and stereotyping are the factors that create stress among the women. They also insisted that women reported higher levels of stress compared to men.

Dr. Hemanalini (2014) discovered in his study that most of the working women affected by stress in their working atmosphere due to insecurity in their jobs and fixed by high targets.

Dr.Madireddi SSV Srikumar(2022) had mentioned that In order to maintain excellent health and overall welfare, stress management entails coping with stress in a constructive manner. Executives have options for managing stress, even if it is unavoidable in a world that is changing. Regular relaxation, exercise, conversation, scheduling time for social activities, and reasonable self-statement are all part of stress management. Workers who want to master change must evaluate their need for stress management and create plans for lessening the effects of stressful changes at work. Learning impacts how we operate. Staff will be able to perform and adapt more quickly and effectively.

Dr. S. Raja & Dr. M. Ganesan Kanagaraj (2020) had mentioned that, according to statistics, medium and lower-level employees are more stressed than top management. Employees experience physical and mental stress due to heavy workloads and tight deadlines. many businesses use force. Employees who work overtime, that is, after their regular shift and on their days off. Even while the human resources staff runs numerous programmes for the employees, such as fun Fridays, DJ nights, and other events, sadly

none of these are effective in lowering stress. The stress that a person experiences at work might spill over into their personal lives, which can cause relationship issues.

Manoj Kumar &Meenu Chhabra (2022) had mentioned that, whether you are a working adult or a student, it is essentially impossible to live a life without stress in today's world of rapid growth. According to biology, stress is the outcome of a person's inability to react correctly to real or imagined dangers to their bodily or mental well-being. Stress has spread widely phenomenon that manifests itself in different ways in every society or workplace. In the modern workplace, employees typically put in longer hours since their amount of responsibility is increasing and they must work harder to satisfy the higher standards of performance.

Dr. Manikamma & N. Sultanpur (2019) had revealed in their article that the personality traits, expectations, and perceptions mixed with those of her spouse and family members, whether they are employed or stay-at-home parents, it is harder for women to adjust to numerous roles and family responsibilities. This strain will result in stress in females.

Jenny Ojha, Tulsi Ram Bhandari, Renu Karki (2020) had mentioned that One of the most important health problems in the world today is stress, which is a link between an individual and their environment. According to the stated prevalence of stress worldwide, 53% of women and 28% of men experience stress from job and family. In Asian nations, the frequency is significantly greater. In India, 87% of women struggle to balance work and family obligations.

Monika Mittal & Dr. S.S.Bhakar (2018)Working women must thrive on all fronts, including the home and the workplace, to play a larger part in society. Each task must be fulfilled on time and to the best of one's ability. They frequently work longer hours and have role overload, which causes stress and causes them to make sacrifices in one area or another.various factors that might cause discontent and have an impact on performance.

Ms. K. Thamarai selvi and Dr. R. Angayarkanni (2016) In addition to work overload and time constraints, other factors that contribute to stress at work include a lack of rewards, poor performance reviews, a lack of desire, and—most importantly—a lack of autonomy over how people carry out their jobs.

OBJECTIVES OF THE STUDY

1.To Study the Demographic factors of the respondents.

2.To identify the stress Creating factors of working women in both Government and Private sectors.

3. To study the stress reducing factors towards working women with respect to type of government and private sectors**.**

METHODOLOGY

Research methodology is a study of systematically solving the problem. The validity of any research is based on the systematic method of formulating the objectives, data collection, analysis and interpretation.

RESEARCH DESIGN

This study falls under descriptive research and hence descriptive research design was followed.

METHODS OF DATA COLLECTION

The present study is based on primary data. Questionnaire was the main tool for collecting the primary data. The questionnaire was designed in a systematic way of covering adequate and relevant almost all aspects of the study.

SAMPLING METHOD

Non probability convenience sampling techniques was used to select a sample of 173 working women among the working women of Theni District.

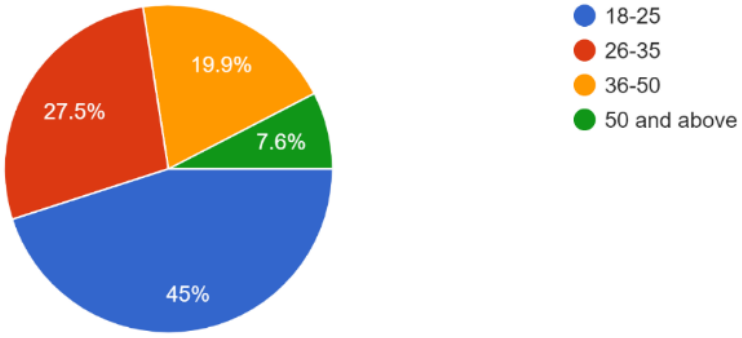
Tools for Data Analysis:

The study used Percentage Analysis and T-test as statistical tools for Analysis.

DATA ANALYSIS AND INTERPRETATION

1. Age Group

Sl.No.	Ages	No. of Respondents	Percentage (%)
1	18 - 25	77	45
2	26 - 35	47	27.5
3	36 - 50	34	19.9
4	50 and above	13	7

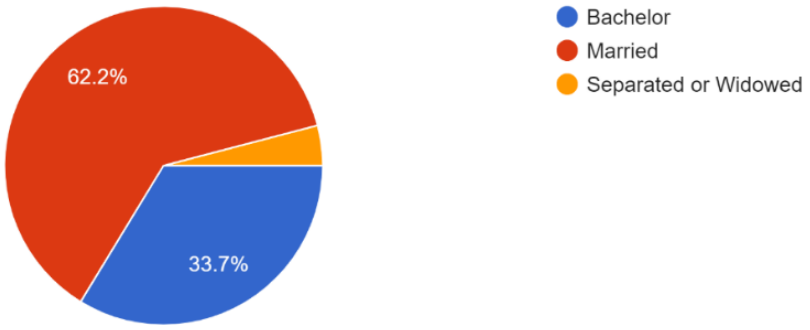


Inference :

From the above table it is inferred that majority of the respondents 45% are the age groups between 18-25.27.5 % of respondents between 26-35 age;19.9% of respondents between 36-50 age.7% of respondents between the age 50 and above.

2. Marital Status

Sl.No.	Marital Status	Percentage (%)
1	Bachelor	33.7
2	Married	62.2
3	Separated or widowed	4.1

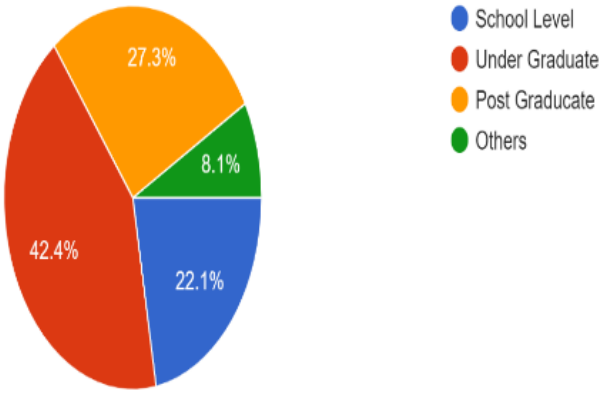


Inference

From the above table it is inferred that majority of the respondents 62.2% are married .33.7% respondents are Bachelor :4.1%of respondents are separated or widowed.

3. Educational Qualification

Sl.No.	Qualification	Percentage (%)
1	School level	22.1
2	Under Graduate	42.4
3	Post Graduate	27.3
4	Others	8.1

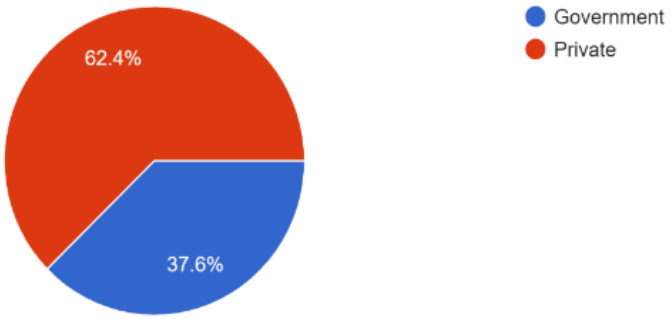


Inference

From the above table it is inferred that majority of the respondents 42.4% are UG level.27.3% respondents are PG level:22.1%of respondents are School level and 8.1% respondents belongs to others.

4. Type of Work

Sl.No.	Sector	Percentage (%)
1	Government	37.6
2	Private	62.4

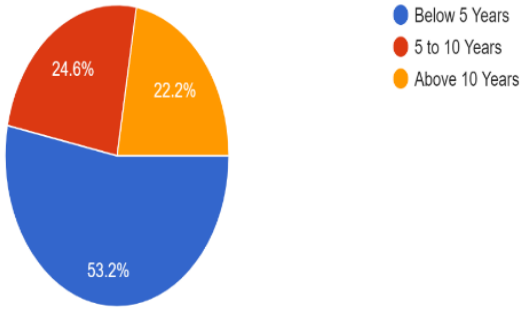


Inference

From the above table it is inferred that majority of the respondents 42.4% are UG level.27.3% respondents are PG level:22.1%of respondents are School level and 8.1% respondents belongs to others.

5. Number of years of service

Sl.No.	Year of service	No. of Respondents	Percentage (%)
1	Below 5 Years	92	53.2
2	5 – 10 Years	42	24.6
3	Above 10 Years	38	22.2

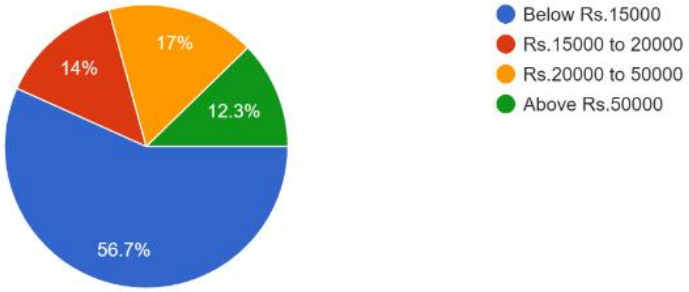


Inference:

From the above table it is inferred that majority of the respondents 53.2% are below 5 years of service.24.6% respondents are between 5-10 years of service:22.2%of respondents are having above 10 years of service

6. Salary per Month

Sl.No.	Salary per month	No. of Respondents	Percentage (%)
1	Below 15000	97	56.7
2	15000 – 20000	24	14
3	20000 - 50000	29	17
4	Above 50000	21	12.3

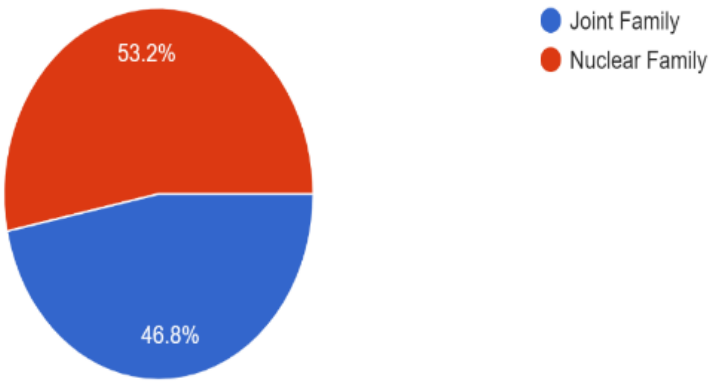


Inference

From the above table it is inferred that majority of the respondents 56.7% got salary below Rs.15,000; 17% of the respondents got salary between 20000 – 50000; 14% of the respondents got salary between 15000 – 20000 ; 12.3% of the respondents got salary Above 50000.

7. Family Status

Sl.No.	Familty Status	No. of Respondents	Percentage (%)
1	Joint family	80	46.8
2	Nuclear family	92	53.2



Inference:

From the above table it is inferred that majority of the respondents 53.2% are from nuclear family. 46.8% of respondents from Joint family.

II)T test formula

T-test Sir William gusset contributed a lot to the theory of small samples Gusset published his discovery in 1905 under a pin name 'student' and it is popularly known as ’t’ -test. It is used to find out the significance of difference between the means of two variables.

The Formula to find t-value is, t= $M1-M2 \sqrt{} S1\ 2\ N1 + S2\ 2\ N2$

Differential Analysis

Objective – 2

To find out the difference in the stress of government and private sectors among working women in the Theni District.

Hypothesis -1

There is no significance difference in the stress of government and private sectors among working women in the Theni District.

T- Test for two independent Means

Creating stress towards working women with respect to type of government and private sectors.

Variable	Sector	N	Mean	Standard Deviation	T- Value	P value
Creating Stress	Government Employee	64	11.64	5.46	-2.83	0.002
	Private Employee	109	14.17	5.75		

Null Hypothesis:

There is no significant difference Stress between Government Employee and Private Employee

Alternative Hypothesis:

There is significant difference Stress between Government Employee and Private Employee

T- Test for two independent Means

Reducing stress towards working women with respect to type of government and private sectors.

Variable	Sector	N	Mean	Standard Deviation	T- Value	P value
Reducing Stress	**Government Employee**	64	28	6.91	-1.35	0.089
	Private Employee	109	29.82	9.27		

Null Hypothesis:

There is no significant difference Reducing Stress between Government Employee and Private Employee

Alternative Hypothesis:

There is significant difference Reducing Stress between Government Employee and Private Employee

CONCLUSION

In this study we concluded that There is no significant difference stress factors and also the Stress reducing factors between both private and Government working women employee. between This study reveals that it is necessary for every woman has to manage all the stress, but it is not possible all the times. By taking several efforts regularly can help working women to cope up with stress which leads to be happier at work and as well as to manage the family demands. The steps may include establishing job stability, developing a mechanism to manage the physical and emotional stress caused by work through Yoga, Meditation, encouraging extended vacations, preferred work hours, social support networks, and educational possibilities for ongoing self-improvement should be provided. It is important to reminisce that the responsibility of a

well-balanced work life scenario lies as much with the working women as with the organizations they work in.

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ARTIFICIAL INTELLIGENCE IN HEALTH CARE

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ABSTRACT

Artificial intelligence is a multidisciplinary field whose goal is to systematize activities that currently require human intelligence. The most important problem areas addressed in A.I. can be summarized as perception, Manipulation, Reasoning, Communication, Learning and Health care. Artificial intelligence is the ability of a computer or a robot controlled by a computer to do tasks that are usually done by human because they require human intelligence and discernment.

Keywords: Cluster, Machine learning, Deep learning, Image recognition, Natural language processing Reasoning**,** Problem solving**,** Perception

INTRODUCTION:

Artificial intelligence is a future field in computer science and engineering that represents the way in which a machine can simply do a task that would otherwise require human intervention and intelligence. Basically, a way through which a machine can think on its own to execute a task Through artificial intelligence, a machine can implement any simple or complex task with greater efficiency and speed than humans. Many academics now believe that artificial intelligence will usher in the next digital revolution.

Development in technology and the use of science in several things have become advantages to society, and many things are becoming harmful. As many hospitals are

now continuing to maintain patient medical records online, they are becoming more prone to cyber theft. So, one of the major difficulties faced by the healthcare industry is cyber security. Patients' medical records are breached, which is very precious for their health. When a data breach occurs, not only patient personal information is at risk but also the patient's privacy, which is also violated. Beside cyber security, there is also a lack of price transparency, which is a major problem faced by the healthcare industry. Many patients are now conducting prior research about the facilities and prices offered by the healthcare department. Due to this, any official department not making their pricing public will not come to the attention of the patient. Another problem faced by the healthcare association is patient experience. The healthcare industry is now facing problems retaining and attracting customers with great facilities and low costs. A healthcare official's workload is so intense that they must priorities their personal lives in order to fulfil their responsibilities. An increase in the price of pharmaceutical drugs has created a major problem for healthcare enterprises and patients.

Artificial intelligence and further improvements in technology Treatment and analysis of diseases will be much easier and more cost effective. Many tech start-ups are using artificial intelligence to detect diseases well before they become critical so that they can be easily cured in advance. Many firms are employed in the diagnosis of deadly diseases such as cancer well in advance through machine learning and artificial intelligence. To improve patient health as quickly as possible, hospitals develop a clinical plan for the patient, but sometimes clinical plans do not go as planned; in such cases, artificial intelligence will be very helpful, as a better plan will be completed through machine learning. Organizational work will also be made easier through artificial intelligence. All the payment transactions will be easily managed. Patients' mental health and physical condition will be easily diagnosed through artificial intelligence. A specific drug given to a patient is helping the patient to fight the disease will be easy to achieve through machine learning and artificial intelligence.

As with automation after the industrial revolution, it is hard to think of any area of our lives that will not be affected by this nascent data-driven technology. Artificial intelligence is already with us in healthcare too. Google's DeepMind has taught machines to read retinal scans with at least as much accuracy as an experienced junior doctor. Babylon, the health app start-up, claims its chatbot has the capacity to pass GP exams, although this is contested by the Royal College of General Practitioners.

TYPES OF AI

- Artificial Narrow Intelligence
- Artificial General Intelligence
- Artificial Super Intelligence

Artificial Narrow Intelligence:

Weak artificial Intelligence is artificial intelligence that implements a limited part of mind or as narrow AI is focused on one narrow task. in John Searle's terms it "would be useful for testing hypotheses about minds. but would not actually be minds". This article is part of Demystifying AI , a series of posts that try to disambiguate the jargon and myths surrounding AI.

In 1956 ,a group of scientific led by John McCarthy ,a young Assistant – professor of mathematics at the Dartmouth NH, for an ambitious six week project: creating computer that could "use language ,form abstraction and concepts , solve kinds of problems now reserved for human, and improve themselves".

Artificial General Intelligence:

Artificial general Intelligence is the hypothetical ability of an intelligent agent to understand or learn any intellectual task that a human being can .it is a primary goal of some artificial intelligence research and a common topics in science fiction and futures studies. As of 2017 over forty organization are actively researching AGI.

Artificial Super Intelligence:

A super intelligent is a hypothetical agent that possesses intelligence far surpassing that of the brightest and most gifted human mind. “super intelligent” may also refer to a property of the problem – solving system whether or not these high – level intellectual competencies are embodied in agent that act in the world .

Super intelligent has long been the muse around the dystopian science fiction which showed how robot over run, over power or enslave humanity .in addition to the replication of multi- faceted human behavioural intelligence focuses on the perspective of not just being able to understand/ interpret human emotions and experience, but instead, it must also evoke emotional understanding beliefs and desires of its own, based on it ' s understanding functionality.

LITERARY SURVEY:

Will artificial intelligence solve the human-source crisis in health care?

The healthcare workforce is in crisis due to a global shortage of doctors, ageing and burnout physicians, and increased demand for chronic health care. There is a global shortage of over 17 million healthcare workers, in addition to an ageing workforce, and we can see sleep disorders and burnout among healthcare workers as problems and gaps in society that can be solved by the use of technology and artificial intelligence. Artificial intelligence could help in diagnosing diseases much quicker than a doctor; it can also facilitate administrative work, thus reducing work for the staff. Deep Genomics could aid in identifying disease associations in collections of genetic data and medical records. Supercomputers could help in the discovery of new ways a disease could be cured and in clinical trials. AI could be used to reduce virus infection in less than a day of research rather than years, and technology will not only reduce the cost of care but also make it faster, more effective, and solve the healthcare workforce crisis.

The human resource crisis is widening worldwide, and it is obvious that it is not possible to provide car without at a workforce. How can disruptive technologies in

healthcare help solve the variety of human resource problems? Will technology empower physicians or replace them? How can the medical curriculum be improved? Ning worldwide, and it is obvious that it is not possible to provide care without workforce. How can disruptive technologies in healthcare help solve the variety of human resource problems? Will technology empower physicians or replace them? How can the medical curriculum. These questions have been growing for decades, and the promise of disruptive technologies filling them is imminent with digital health becoming widespread. The authors of this essay argue that AI might not only fill the human resources gap but also raise ethical questions we need to deal with today. While there are even more questions to address, our stand is that AI is not meant to replace caregivers, but those who use it will probably replace those who don't. And it is possible to prepare for that.

Artificial intelligence will transform primary care in the following ways:

As we move away from fee-for-service to value-based payments in the population health management industry, it is predictable that many companies are exploring the role of AI to improve their ability to identify and enhance their performance by using population health tools for physicians. Many companies are developing artificial intelligence doctors that will provide health advice directly to patients while reducing the workload for more complex care. With the development of technology, many people are wearing devices that detect early signs of a disease. Physicians may be able to use data from such devices to treat disease at earlier stages. AI-powered machines are diagnosing and treating various types of cancer with greater precision than doctors, including skin cancer, breast cancer, colorectal cancer, brain cancer, and cardiac arrhythmias. These tools, in the hands of primary care doctors, can offer a significant advantage to patients. Artificial intelligence can be used to systematize some primary care with more efficiency and superior speed for patients and doctors.

Artificial intelligence in the neurosciences: A clinician's perspective:

Neurosurgeons receive extensive and lengthy training to equip themselves with various technical skills, and neurosurgery requires a great deal of pre-, intra-, and postoperative clinical data collection, decision-making, care, and recovery. The last decade has seen a significant increase in the importance of artificial intelligence (AI) in neurosurgery. AI can provide great promise in neurosurgery by complementing neurosurgeons' skills to provide the best possible interventional and noninterventional care for patients by enhancing diagnostic and prognostic outcomes in clinical treatment and helping neurosurgeons with decision-making during surgical interventions to improve patient outcomes. Furthermore, AI is playing a pivotal role in the production, processing, and storage of clinical and experimental data. AI usage in neurosurgery can also reduce the costs associated with surgical care and provide high-quality healthcare to a broader population. Additionally, AI and neurosurgery can build a symbiotic relationship where AI helps push the boundaries of neurosurgery and neurosurgery can help AI develop better and more robust algorithms. This review explores the role of AI in interventional and noninterventional aspects of neurosurgery during pre-, intra-, and postoperative care, such as diagnosis, clinical decision making, surgical operation, prognosis, data acquisition, and research within the neurosurgical arena.

Artificial intelligence in thoracic surgery: past, present, viewpoint, and limits:

Thoracic surgeons should be aware of the new opportunities that could affect their daily practice, either through direct use of AI technology or indirect use via related medical fields (radiology, pathology, and respiratory medicine). The objective of this article is to review applications of AI related to thoracic surgery and discuss the limits of its application in the European Union. Key aspects of AI will be developed through clinical pathways, beginning with diagnostics for lung cancer, a prognostic-aided programmer for decision making, robotic surgery, and finishing with the limitations of AI and the legal and ethical issues relevant to medicine. It is important for physicians

and surgeons to have a basic knowledge of AI to understand how it impacts healthcare and to consider ways in which they may interact with this technology. Indeed, synergy across related medical specialties and synergistic relationships between machines and surgeons will likely accelerate the capabilities of AI in augmenting surgical care.

In Cardiac Organization, Artificial Intelligence:

Cardiac disease is considered one of the leading causes of death worldwide. There has been an ongoing demand to create a new way to treat cardiac illnesses, and AI has had an enormous impact on the healthcare industry through its diagnosis and treatment of diseases. Blood clots in the arteries as a result of an unnatural lifestyle, increasing heart risk even in children. To control the problems and symptoms, AI records the patient's responses to doctor's questions.AI will make it easier for doctors to analyses patients and determine which patients require extra care and treatment. High-risk patients will have much better chances of survival. AI can also provide a multi-monitoring feature, which will make it easier for doctors to monitor more than one person at a time. Cardiologists, with the use of artificial intelligence and machine learning, can make choices based on data and new research in that area to treat patients effectively. It also helps the person by cutting down on the price while providing better treatment at the same time. The use of technology in the medical field is allowing people to be cured for less money and with more activity, ensuring that no one dies due to a lack of facilities.

IMPORTANCE OF AI IN HEALTHCARE

Artificial intelligence enhances the speed, precision and effectiveness of human efforts. In financial institutions, AI techniques can be used to identify which transactions are likely to be fraudulent, adopt fast and accurate credit scoring, as well as automate manually intense data management tasks. AI in Healthcare is an umbrella term to describe the application of machine learning (ML) algorithm and other cognitive technologies medical setting…also AI can help make health care more predictive and

proactive by analysing big data to develop improve preventive care recommendations for patients.

ADVANTAGES:

- In a life-critical industry like healthcare, speed and reliability are pivotal to the future of AI. The COVID-19 pandemic has also highlighted how the healthcare industry needs to innovate as incumbents struggle to handle the increased demand for its resources.
- Machine learning, computer vision, and natural language processing (all subsets of AI) can drive clinical decision-making for physicians and staff, as well as several other benefits.
- The diagnosis of diseases will be more effective and earlier than that of a doctor, which will help in fast action.
- With real-time data, clinical decision-making will be much easier with the help of artificial intelligence.
- Start-ups such as Lark use conversational AI to help patients who are suffering from chronic diseases. The platform utilizes health data to monitor activity levels, sleep, and mindfulness, among other things.
- The algorithms analyzed a dataset of 25,000 mammograms and were shown to improve the risk prediction for screening-detected breast cancer. AI algorithms can learn from far more extensive libraries than any radiologist, perhaps a million or more images, rather than relying on eight years of medical school training. Clinicians can focus on care rather than analyzing data.
- All the organizational work accounts for 30% healthcare cost with the help of AI administrative work will be done much faster and efficiently thus saving money.
- AI used in wearable healthcare devices will allow to detect difficulties faster than predictable process.

- Healthcare costs will be concentrated with the use of AI, making basic health facilities available to all.
- Time needed for diagnosis and treatment will be reduced with the use of artificial intelligence.

CONCLUSION

AI is at the centre of a new initiative to build computational models of intelligence . The main assumption is that intelligence can be represented in terms of symbol structures and symbolic operations which can be programmed in a digital computer. Artificial intelligence will be very beneficial for a country like India, where healthcare conveniences are not reasonable for all and are a luxury for some people. With the use of AI, cost reductions in basic healthcare facilities will be applied, and everybody will be able to afford the necessary facilities in their lives. With the rise of communicable and noncommunicable diseases, as well as the spread of new virus infections, artificial intelligence (AI) will become more useful to people, as it will detect diseases much faster and cure patients' lives much more effectively. Growth in population is creating a lot of burden on our healthcare staff, due to which healthcare staff is not getting proper sleep and is being exhausted mentally, reducing their effectiveness in patient care and treatment. With the use of AI smart robots, we will be able to assist our healthcare staff in providing much more effectiveness in patient care and treatment, while also reducing the burden on healthcare staff. Thus, with the use of AI, more patients will be treated, which will help reduce the demand and supply gaps present in our country. Common men and women will be able to detect small diseases on their own using AI powered smart watches and bands, which will not only save them time that they would have spent going to a hospital, but will also save them money. The possibility of artificial intelligence is massive and will keep growing every year with new inventions in society, providing great help to humankind.

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EFFECT OF PHONON AND MAGNETIC FIELDS ON THE BINDING ENERGY OF A HYDROGENIC DONOR IN A WOODS-SAXON POTENTIAL WELL

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ABSTRACT

Impurities in traditional quantum wells have been studied extensively by various researchers. Novel quantum wells with adjustable size and shape are being investigated worldwide. In the present work, we have calculated the binding energy of a hydrogenic donor in a Woods-Saxon potential well as a function of the width of the quantum well and the barrier height under an applied uniform magnetic field. The effect of phonon field is also considered. It is observed that both these fields have contradictory effect on the binding energy. Hydrogenic donor binding energy increases due to magnetic field, while it decreases due to phonon field.

1. INTRODUCTION

Low dimensional Semiconductor systems are attracting considerable attention, in recent days, due to their many possible applications. With the crystal growth techniques such as molecular beam and metal organic chemical vapor deposition, quantum wells with varied potential profile have been possible. Several researchers [1-4] have studied the behavior of donors in different types of traditional quantum wells. Greene and Bajaj [1] have calculated the ground state and four excited state binding energies of a hydrogenic impurity in a rectangular quantum well. Luna Acosta [2] has calculated the

binding energy of a hydrogenic impurity in an effective parabolic quantum well variationally. Jiang and Wen [3] have reported the ground state binding energy of a donor and exciton in a triangular quantum well. Arulmozhi and Balasubramanian [4] have investigated the binding energies of a donor and a Wannier exciton in near triangular quantum well.

Novel quantum wells like Poschl-Teller [5], Rosen-Morse [6] and Woods-Saxon [7-11] quantum wells are attracting considerable attention due to their adjustable size and shape, unlike the traditional quantum wells. It is also of interest to study the effects of various external fields on the properties of these quantum wells. Anitha and Arulmozhi [5] have studied the binding energies of the heavy hole and light hole exciton in a Poschl-Teller quantum well including the effects of pressure and temperature individually and simultaneously. Ungan and Bahar [6] have studied the control of optical specifications such as the nonlinear optical rectification (NOR), the second harmonic generation (SHG) and the third harmonic generation (THG) of quantum well (QW) that has the Rosen-Morse potential confinement though intense laser field.

Restrepo et al [7] have theoretically studied the effects of non-resonant intense laser field and electric and magnetic fields on the optical properties in a quantum well (QW) with Woods–Saxon potential profile. Liangliang Lu et al [8] have made a theoretical study on the effects of intense laser fields on the nonlinear properties of donor impurities in a quantum dot with Woods–Saxon potential with the matrix diagonalization method. Ungan et al [9] have presented a detailed theoretical study on the influence of the static electric, magnetic, and non-resonant intense THz laser fields on the nonlinear optical properties such as nonlinear optical rectification (NOR) and second harmonic generation (SHG), of a quantum well that has the Woods-Saxon potential profile.

Wenfang Xie [10] has obtained the binding energies of the ground (L=0) and first excited (L=1) states of an exciton confined in a quantum dot with the Woods–Saxon

potential as functions of the dot radius. Zhi-Hai Zhang et al [11] have investigated the third harmonic generation (THG), linear and nonlinear optical absorption coefficients (OACs), and refractive index changes (RICs) in a Woods–Saxon quantum well (QW) modulated by the hydrostatic pressure and applied electric field. In the present work, we have attempted to investigate the effects of phonon [12] and magnetic fields [13] on the hydrogenic donor binding energy in Woods-Saxon quantum well.

2. THEORY

The potential profile $V(z)$ of Woods-Saxon well is given by [7],

$$V(z) = \frac{V_0}{1+\exp\left(\frac{z_0-z}{\lambda}\right)} + \frac{V_0}{1+\exp\left(\frac{z_0+z}{\lambda}\right)} \quad (1)$$

where L is the width of the well, z_o=L/2, λ is a parameter describing the slope of the barrier of the potential profile taken to be 1 nm and V_0 is the barrier height which depends on the Al composition x as [4]

$V_o = 0.65\Delta E_g$ and $\Delta E_g = 1.155x + 0.37x^2 eV$ (2)

We have assumed the conduction and valence band discontinuities in the ratio 65:35 [4].

2.1 Hydrogenic donor in Woods-Saxon quantum well

The Hamiltonian for a hydrogenic donor placed at the center of a finite symmetrical Woods-Saxon potential well formed by $Ga_{1-x}Al_xAs/GaAs/Ga_{1-x}Al_xAs$ is given in the effective mass approximation as [4],

$$\mathcal{H} = -\frac{\hbar^2}{2m^*}\nabla^2 + V(z) - \frac{e^2}{\varepsilon_0 r} \quad (3)$$

where e is the electronic charge, ε_0 is the dielectric constant of bulk GaAs and m* is the electron effective mass in GaAs. With effective Rydberg R^* as the unit of energy $\left(R^* = \frac{m^* e^4}{2\hbar^2 {\varepsilon_0}^2}\right)$ and effective Bohr radius a^* as the unit of length $\left(a^* = \frac{\varepsilon_0 \hbar^2}{m^* e^2}\right)$, the Hamiltonian becomes,

$$\mathcal{H} = -\nabla^2 + V(z) - \frac{2}{r} = -\left[\frac{1}{\rho}\frac{\partial}{\partial\rho}\rho\frac{\partial}{\partial\rho} + \frac{1}{\rho^2}\frac{\partial^2}{\partial\phi^2} + \frac{\partial^2}{\partial z^2}\right] + V(z) - \frac{2}{r} \quad (4)$$

2.2 Effect of phonon field

Hydrogenic donor binding energy is obtained in $Ga_{1-x}Al_xAs/GaAs$ Woods-Saxon quantum well taking into account the phonon confinement effect including the Aldrich-Bajaj effective potential. The Aldrich-Bajaj potentials have proven to describe very well the electron-phonon interaction given by [12],

$$V_{AB}(r) = -\frac{e^2}{2\,\varepsilon'\,r}\exp(-Qr) + \frac{e^2 Q}{2\varepsilon'}\frac{\exp(-Qr)}{1+\frac{P}{12}+\frac{P}{\left(4+\frac{P}{3}\right)}} \quad (5)$$

In effective Rydbergs, $V_{AB}(r) = -\frac{\varepsilon_o}{\varepsilon'}\exp(-Qr) + \frac{Q\varepsilon_o r}{\varepsilon'}\frac{\exp(-Qr)}{\left(\frac{12+P}{12}+\frac{3P}{12+P}\right)}$ (6)

where $P = \frac{e^2 Q}{2\varepsilon'\hbar\omega}$, $Q = \left(\frac{2m^*_{ep}\omega}{\hbar}\right)^{\frac{1}{2}}$, $m^*_{ep} = m^*_e\left(1+\frac{\alpha}{12}\right)\left(1-\frac{\alpha}{12}\right)$. m^*_{ep} is the electron polaron mass. $\frac{1}{\varepsilon'} = \frac{1}{\varepsilon_\infty} - \frac{1}{\varepsilon_o}$. ε_∞ is the high dielectric constant of GaAs = 10.9.

The Hamiltonian for the same hydrogenic donor including phonon field is given by,

$$\mathcal{H} = -\frac{\hbar^2}{2m^*}\nabla^2 + V(z) - \frac{e^2}{\varepsilon_0 r} + V_{AB}(r) \quad (7)$$

In effective Rydbergs, $\mathcal{H} = -\nabla^2 + V(z) - \frac{2}{r} + V_{AB}(r)$ (8)

The trial wavefunction for the ground state of the hydrogenic donor is taken as [4],

$$\psi = \begin{cases} N\, e^{-\alpha^2 z^2}\, e^{-ar} & -\frac{L}{2} < z < \frac{L}{2} \\ N_1\, e^{-\beta z} e^{-ar} & z > \frac{L}{2} \\ N_1\, e^{\beta z} e^{-ar} & z < -\frac{L}{2} \end{cases} \quad (9)$$

where α, β and a are variational parameters. N is the normalization constant. N_1 is related to N through the continuity of ψ. $<\mathcal{H}>$ is evaluated and minimized w.r.t. the variational parameters. The donor binding energy of the ground state is obtained as,

$$E_B = E_1 - E \quad (10)$$

E_1 is the ground quantized energy level for the electron in the bare quantum well (without the hydrogenic donor) obtained variationally and E= $<H>_{min}$.

2.3 Effect of magnetic field

The Hamiltonian for the same hydrogenic donor in the presence of an applied magnetic field B is given in the effective mass approximation as [13],

$$H = \frac{1}{2m^*}\left(\vec{p} + \frac{e\vec{A}}{c}\right)^2 + V(z) - \frac{e^2}{\varepsilon_0 r} \quad (11)$$

where $\vec{p} = -i\hbar\vec{\nabla}$, c is the velocity of light, $\vec{A}$ is the vector potential related to magnetic field, $\vec{B}$ as $\vec{A} = \nabla \times \vec{B}$. We have considered Z-axis as the growth axis of the quantum well structure. The vector potential $\vec{A}$ and the magnetic field $\vec{B}$ are chosen to be,

$$\vec{B} = (0,0,B) \text{ and } \vec{A} = \left(-\frac{B}{2}y, \frac{B}{2}x, 0\right) \quad (12)$$

In effective Rydbergs, the Hamiltonian can be written as,

$$H = -\nabla^2 + \frac{1}{4}\gamma^2\rho^2 + \gamma L_Z + V(z) - \frac{2}{r} \quad (13)$$

where L_z is the angular momentum and γ is the dimensionless measure of the magnetic field ($\gamma = \frac{e\hbar B}{2m^* cR^*}$). γ = 1 corresponds to B = 59.7 kG.

The trial wave function used for the ground state of a hydrogenic donor in the presence of magnetic field is of the form [13],

$$\Psi = \begin{cases} Ne^{-\alpha^2 z^2} e^{-ar} e^{-\lambda\rho^2} & \frac{-L}{2} < z < \frac{L}{2} \\ N_1\, e^{-\beta z} e^{-ar} e^{-\lambda\rho^2} & z > \frac{L}{2} \\ N_1 e^{\beta z} e^{-ar} e^{-\lambda\rho^2} & z < -\frac{L}{2} \end{cases} \quad (14)$$

where α, β, a and λ are variational parameters. N is the normalization constant. N_1 is related to N through the continuity of Ψ. $< H >$ is evaluated and minimized w.r.t. the variational parameters. The donor binding energy of the ground state is obtained as,

$$E_B = E_1 + \gamma - E \quad (15)$$

E_1 is the ground quantized energy level for the electron in the bare quantum well (without the hydrogenic donor) obtained variationally and E= $<H>_{min}$.

3. RESULTS AND DISCUSSION

Physical parameters of GaAs used in our calculations are ε_0 = 13.2,m^* = 0.0665m_0 (m_0 is the free electron mass), a^* = 105 Å and R^* = 5.19 meV. Numerical calculations are carried out using MATHCAD software.

3.1 Hydrogenic donor in Woods-Saxon quantum well without any external fields

Figure 1 shows the variation of the binding energy (E_B) of the ground state of a hydrogenic donor in a Woods-Saxon potential well as a function of the well width (L) for various Al compositions (x) without any external fields. For a given Al composition (x), the binding energies increase as L is reduced slowly until they reach a maximum value due to the confinement of the donor inside the well and then start decreasing rapidly, as the well width is further reduced, due to the spread of the donor wavefunction to the barrier region.

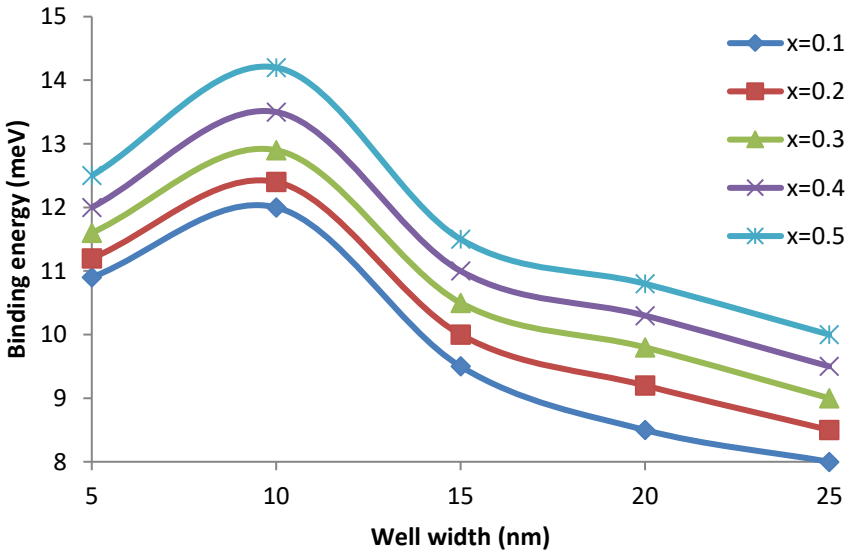

Fig 1. *Variation of the binding energy (E_B) of the ground state of a hydrogenic donor in a Woods-Saxon potential well as a function of the well width (L) for various Al compositions (x) without any external fields*

For a given well width (L), as the Al composition (x) increases, the binding energy increases and the well width at which the binding energy shows a turn over decreases, since the barrier height increases as the Al composition (x) increases. This behavior is quantitatively similar to the case of a hydrogenic donor in all symmetric quantum wells reported in literature [1-4].

3.2 Hydrogenic donor in Woods-Saxon quantum well with phonon field

Figure 2 shows the variation of the binding energy (E_B) of the ground state of a hydrogenic donor in a Woods-Saxon potential well as a function of the well width L for various Al compositions (x) with phonon field. It is observed that when the phonon field is included using Aldrich-Bajaj potential, the overall behaviour remains the same but the binding energy decreases for a given well width (L) and for a given Al composition (x). When phonon field (quantized lattice vibration) is included, the hydrogenic donor, due to its vibration, gets loosely bounded to the quantum well and hence the binding energy decreases.

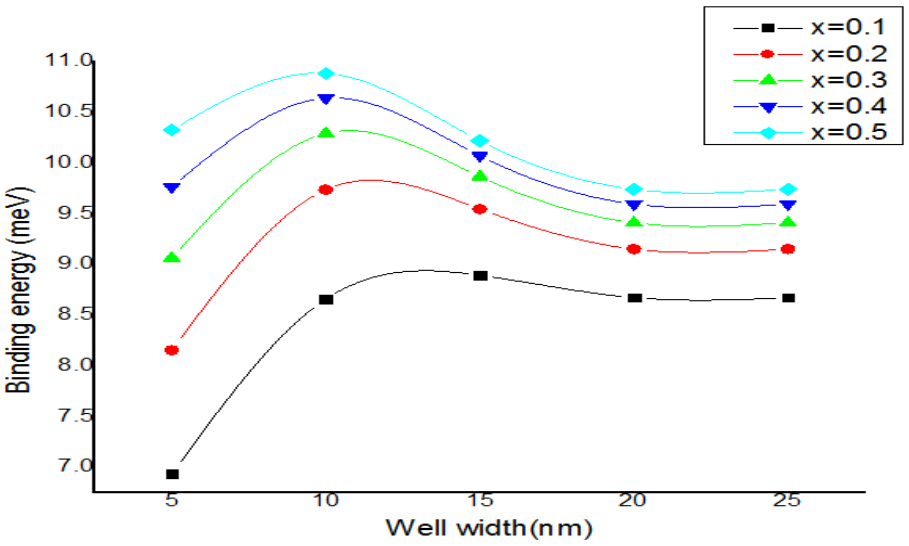

Fig 2. *Variation of the binding energy (E_B) of the ground state of a hydrogenic donor in a Woods-Saxon potential well as a function of the well width L for various Al compositions (x) with phonon field*

3.3 Hydrogenic donor in Woods-Saxon quantum well in the presence of magnetic field

Magnetic field γ=1

Figure 3 shows the variation of the binding energy (E_B) of the ground state of a hydrogenic donor in a Woods-Saxon potential well as a function of the well width L for various Al compositions (x) with magnetic field, γ =1. Observations are given after analyzing the graphs for γ=2 and γ=3.

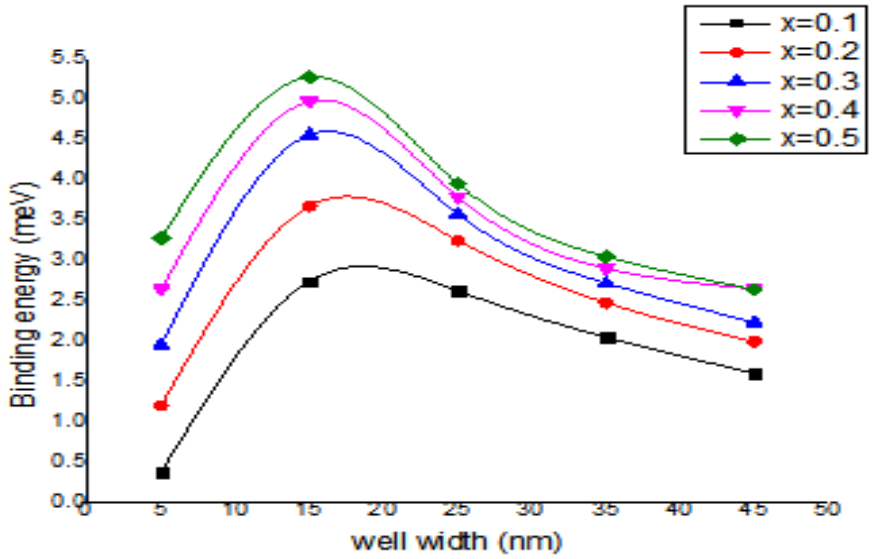

Fig 3. *Variation of the binding energy (E_B) of the ground state of a hydrogenic donor in a Woods-Saxon potential well as a function of the well width L for various Al compositions (x) with magnetic field, γ =1*

Magnetic field γ=2

Figure 4 shows the variation of the binding energy (E_B) of the ground state of a hydrogenic donor in a Woods-Saxon potential well as a function of the well width L for various Al compositions (x) with magnetic field, γ =2.

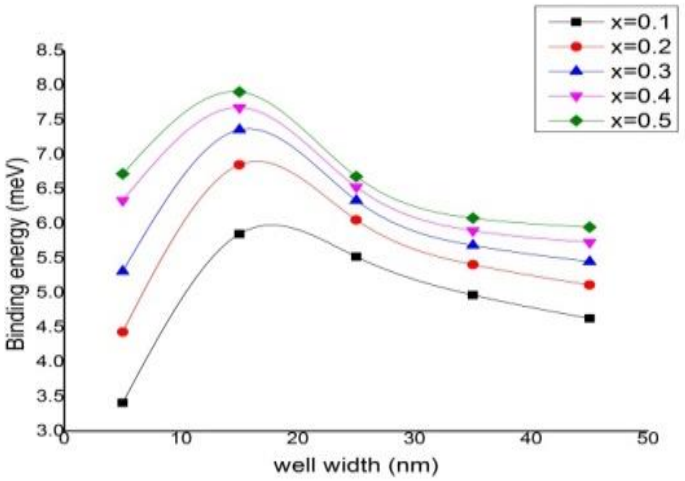

Fig 4. *Variation of the binding energy (E_B) of the ground state of a hydrogenic donor in a Woods-Saxon potential well as a function of the well width L for various Al compositions (x) with magnetic field, $\gamma = 2$*

Magnetic field, γ=3

Figure 5 shows the variation of the binding energy (E_B) of the ground state of a hydrogenic donor in a Woods-Saxon potential well as a function of the well width L for various Al compositions (x) with magnetic field, $\gamma = 3$.

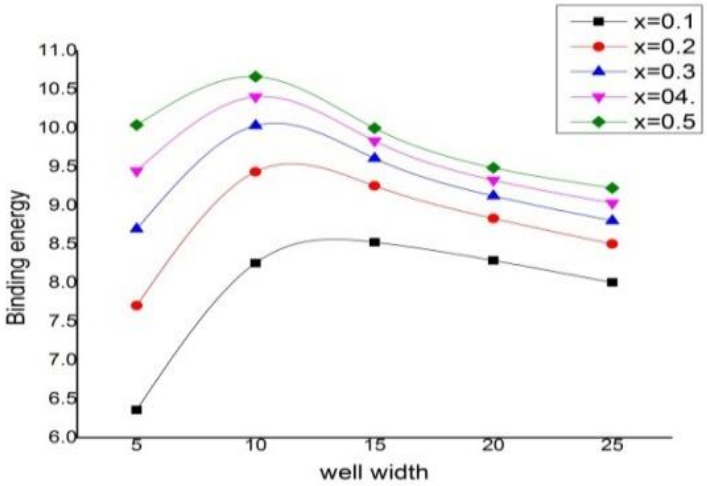

Fig 5. *Variation of the binding energy (E_B) of the ground state of a hydrogenic donor in a Woods-Saxon potential well as a function of the well width L for various Al compositions (x) with magnetic field, $\gamma = 3$*

For a given x and L, as the magnetic field increases, the binding energy increases [13]. Following additional observations are also made:

1. For a given x, the value of well width at which the turnover occurs is nearly the same for all values of the magnetic field.
2. The separation between the graphs, for various x values, increases as the well width is reduced. This is due to the fact that the donor experiences double confinement due to reduced well width and magnetic field.

4. CONCLUSIONS

We have presented a variational calculation of the binding energy of a hydrogenic donor impurity in a Woods-Saxon quantum well. The effects of phonon and magnetic fields are considered individually. For a given x, the binding energy increases slowly as the well width is reduced till it reaches a maximum and then show a rapid decrease, as the well width is further reduced and the value of well width at which the turnover occurs is nearly the same for all values of the magnetic field. For a given well width (L), as the Al composition (x) increases, the binding energy increases and the well width at which the binding energy shows a turn over decreases and the binding energy increases with magnetic field strength, γ. In the present work, individual effects of phonon and magnetic fields are studied. Phonon field decreases the binding energy but magnetic field increases the binding energy. Combined effects of these fields will be taken up in future. Our theoretical studies of phonon and magnetic fields may give a new degree of freedom in the manufacture of opto-electronic devices with magnetic field applications.

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ASSESSMENT OF OPEN WELL WATER QUALITY IN THENI DISTRICT

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ABSTRACT

The quality of water plays a vital role in the lives of human beings. The physical and chemical parameters of ground water keeps on changing due to raining, climate change and other human activities. People in Indian villages consume well water for drinking and also for other domestic purpose. Hence the research on quality of water from time to time is necessary. In this paper we present the physico chemical properties of open well water in different blocks such as Bodinayakkanur, Cumbum, Periyakulam and Aundipatty of Theni district. The parameters such as , pH, total hardness, total dissolved solids, electrical conductivity, Calcium (Ca^{2+}), Magnesium (Mg^{2+}) , Sodium (Na^{+}) , Potassium(K^{+}) , Chloride(Cl^{-}), Nitrate(NO_3^{-}) and Sulphate (SO_4^{2-}) are analysed and reported. The study was done in the February month of 2022. The results show that all the parameters are within the permissible limit given by WHO. The quality of water in these areas is not affected mush and it becomes potable.

Key words : Open well Water, Physico – Chemical Parameters, Theni District

INTRODUCTION

Water is the main element for all living beings [1]. Consumption of water with good quality is necessary to lead a healthy life [2]. In India many villages depend the well water for their needs. The parameters of well water will be based on the composition of soil and other minerals in the earth crust. The potable water quality is also related to human activities and the industrial effluents which are discharged to

ground. The World Health Organization estimated that up to 80 % of all sicknesses and diseases in the world are caused by inadequate sanitation, polluted water or unavailability of water [3 -7]. A review of 28 studies carried out by the World Bank gives the evidence that incidence of certain water borne, water washed, and water based and water sanitation associated diseases are related to the quality and quantity of water and sanitation available to users. Assessment of water quality is location specific and the research has been done over globally and periodically. The values of the parameters keep on changing from year to year depending on the rain fall, agriculture and other natural processes. In Theni district, the ground water quality for irrigation in the farms of Horticultural college and research institute, Periyakualm has been reported in the year 2021[8]. The report says that the magnesium content of water samples is more than calcium content. The physico chemical analysis of Mullai Periyar river has been reported [9]. The seasonal variation of drinking water quality in urban environment of Bangladesh has been reported recently [10]. In Theni district, according to Theni Water board report, the ground water has been exploited in many blocks such as Cumbum, Bodinayakkanur and so on. The people residing in Bodinayakkanur, Cumbum, Periyakulam and Aundipatty blocks use open well water. Hence it is a need of the hour to assess the water quality of the well water found in the above mentioned blocks. In this paper, we present the parameters such as , Calcium (Ca^{2+}), Magnesium (Mg^{2+}) , Sodium (Na^{+}) , Sodium adsorption ratio (SAR) Potassium(K^{+}), Chloride(Cl^{-}), Nitrate(NO_3^{-}), Carbonate (CO_3^{2-}) and Sulphate (SO_4^{2-}) in Vadaputhupatti, Andipatti, Vaigaiputhur, Chinnamanur, Kovindhanagaram, Veerapandi, Periyakulam, Rasingapuram, Boothipuram and Bodinayakanur of Theni District. The well water has been used by 25 % of the rural people in different taluks of Theni district.

2. MATERIALS AND METHODS

2.1. STUDY AREA

Well water samples were collected in polyethene bottles from various places in Theni district. The places with sample code are Vadaputhupatti (W1), Andipatti(W2),

Vaigaiputhur(W3), Chinnamur(W4), Kovindhanagaram(W5), Veerapandi(W6), Periyakulam(W7), Rasingapuram(W8), Boothipuram(W9) and Bodinayakanur (W10) and the analysed parameters are compared with the standards given by WHO. The map of Theni district is shown in Figure 1.

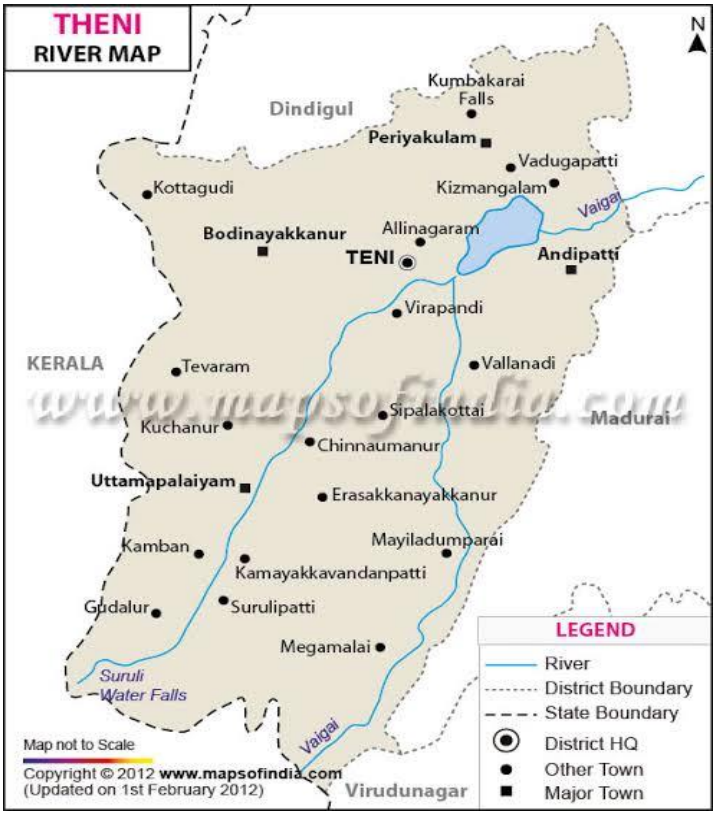

Fig. 1. Map of Theni district showing sample locations

2.2 ANALYSIS OF WATER QUALITY PARAMETERS

The collected ground water samples were taken for the analysis of qualitative parameters such as pH, electrical conductivity (EC), total hardness, Calcium (Ca^{2+}), Magnesium (Mg^{2+}) , Sodium (Na^{+}) , Potassium(K^{+}) , Chloride(Cl^{-}), Sulphate (SO_4^{2-}) in the present study. All the parameters are analysed in the lab using different procedures given below. The sodium absorption ratio and the geo type are obtained from District Water board, Theni.

2.3 DETERMINATION OF PHYSICO CHEMICAL PARAMETER

2.3.1. DETERMINATION OF CALCIUM

50 mLof sample was taken in conical flask and 1mL of NaOH was added to raise pH to 12.0 and a pinch of Mureoxide indicator was added. It was titrated immediately with EDTA till pink colour changes to purple. The volume of EDTA required was noted.

$$\text{Calcium (mg/L)} = \frac{\text{Volume of EDTA used} \times 400.8}{\text{Volume of sample}}$$

2.3.2. DETERMINATION OF MAGNESIUM

$$\text{Magnesium (mg/L)} = \frac{(Y - X) \times 400.8}{\text{Volume of sample} \times 1.645}$$

Y = Volume of EDTA used in total hardness determination

X = Volume of EDTA used in calcium determination for the same volume of the sample

2.3.3. DETERMINATION OF CHLORIDE

Chloride ion content of the water sample was determined by argentometric methods.50 ml of water sample was taken in conical flask. 2 to 3 drops of potassium chromate solution was added as the indicator. This solution was titrated with 0.1N $AgNO_3$ till the colour changes from yellow to brick red, the reading was noted from burette.

$$\text{Chloride (mg/L)} = \frac{(\text{Volume} \times \text{Strength}) \text{ of } AgNO_3 / 1000 \times 35.5}{\text{Volume of sample}}$$

Chloride Ion Concentration (mg/L) =(Ml of AgNO3 used-0.2) X500 / ML of sample use

2.3.4. DETERMINATION OF SULPHATE

Suitable volume of the sample was taken and diluted to 100 mL into a 250 mL Erlenmeyer flask. 20 mL of buffer solution was added and mixed well. The flask was constantly stirred with the help of stirrer. One spatula of $BaCl_2$ crystals were added with

stirring. The stirring was continued for one minute after Addition of $BaCl_2$. The suspension was poured into an absorption cell and turbidity was measured.

2.3.5. DETERMINATION OF SODIUM AND POTASSIUM

The concentration of sodium in water sample was determined by flame photometric methods. The water sample was filtered through a filter paper to remove any suspended matter. The concentration of sodium is determined from flame photometer. The instrument was required to prepare calibration curve. The calibration curve was prepared in the range of 1 to 10 ppm by using various standard solution of NaCl / KCl in HCl solution. By comparing the calibration curve, the sodium / potassium concentration in water sample was determined. The intensity of characteristic radiation was proportional to concentration.

2.3.6. DETERMINATION OF SODIUM ADSORPTION RATIO

The Sodium Adsorption Ratio (SAR) is an irrigation water quality parameter used in the management of sodium-affected soils. It is an indicator of the suitability of water for use in agricultural irrigation, as determined from the concentrations of the main alkaline and earth alkaline cations present in the water.

2.3.7. WATER SAMPLING

Well water samples were collected in polythene bottles from various places in Theni district. The places are Bodinayakanur, Sangarapuram, Dombuchery, Theni (koduvilarpatti), Manikkapuram, Vazhaiyathupatti, Seelayampatti (Chinnamanur), Sepalakottai, Pusarigowdanpatti, and Periyakulam. The water samples were labeled as per the following table.

3. RESULT AND DISSCUSION

The water quality parameters of all the well water samples are shown in Table 1. All the results are compared with standard permissible limit recommended by the World Health Organisation (WHO)

Table 1 : WHO standard is given in Bracket

Sample	Sampling site	pH (7-8.5)	Cl^- (250 mg/L)	SAR	SO_4^{2-} (200 mg/L)	Na^+ (20 mg/L)	K^+ (0.75 mg/L)	Ca^{2+} (75 mg /L)	Mg^{2+} (50mg/ L)
S1	Bodinayakanur	7.74	1.5	3.005	8.0	4.98	0.015	1.6	3.9
S2	Sangarapuram	7.19	25.3	1.001	-	4.95	0.045	23.2	25.8
S3	Dombuchery	7.85	9.7	2.848	5.7	6.36	0.030	4.2	5.8
S4	Koduvilarpatti	7.44	24.3	0.023	1.6	8.01	0.015	11.5	14.7
S5	Manikkapuram	7.83	1.6	0.107	3.9	0.18	0.015	3.0	2.9
S6	Vazhaiyathupatti	7.45	1.1	0.222	4.7	0.38	0.015	2.4	3.6
S7	Seelaiyampatti	7.54	2.2	0.084	7.0	0.18	0.015	5.11	4.49
S8	Sepalakottai	7.33	5.7	0.108	7.9	0.28	0.015	6.3	7.6
S9	Pusarigowdanpatti	7.75	1.8	0.080	6.5	0.16	0.030	4.4	4.6
S10	Periyakulam	7.56	3.1	0.082	6.0	0.18	0.015	5.2	4.8

3.1. pH

pH is measure of intensity of acidity or alkalinity of water. All chemical and biological reactions are directly depended upon the pH of water system. In our findings pH varied from 7.19 – 7.85. Maximum pH was recorded at S3 and minimum was recorded at S2. All the above samples showed their pH value as recommended by WHO and Indian standard values and are suitable for drinking purpose. The graphical representation is shown in Figure.2

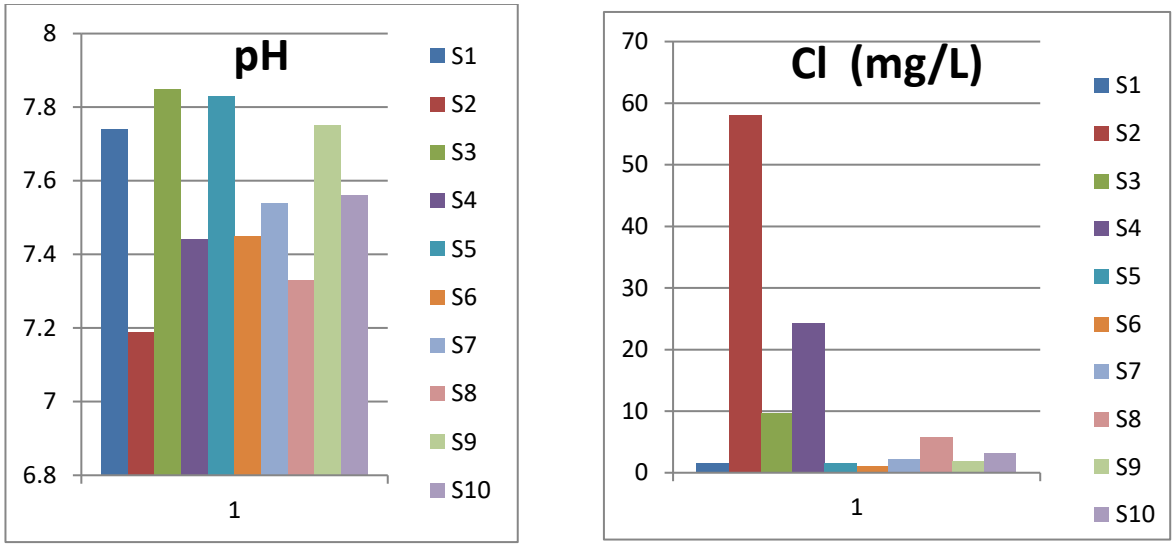

Fig. 2

3.2 CALCIUM

Calcium occurs in water naturally. Calcium in water may be due to the presence of salts in well water samples. Calcium varies from 10 mg/L to 480 mg/L in all types of water. Sea water contains approximately 400 mg/L of calcium. The maximum value was observed at S2 (23.2) and minimum value was observed at S6 (1.1). The level of calcium in all samples of water is within the permissible limit.

3.3. MAGNESIUM

Magnesium hardness of well water varies from 20 mg/L to 500 mg/L. High values of magnesium hardness can be attributed to the large amounts of magnesium salts in well water. High concentration of magnesium reduce utility of water for domestic use while a concentration above 500 mg/L impart an unpleasant taste to water and renders it unfit for drinking. Minimum values are only observed in all the samples.

3.4. CHLORIDE

Chloride ion contents in fresh water are largely influenced by evaporation and precipitation. Chloride ions are generally more toxic than sulphate to most of the plants and are the best indicator of pollution. Chloride content of all the water samples were

found to be low ranging from 10 - 24 ppm. Minimum values were observed at samples S1 and S6. The quality of all the samples was shown to be good for drinking purpose.

3.5. SULFATE

Sulfate is a chemical commonly found in air, soil, water. Since it is soluble in water, sulfate is found at a high concentrate on in many aquifers and in surface water. Combustion of fossil fuel release large qualities of sulfur to the atmosphere. Sulfur in the atmosphere is oxidized to sulfate and eventually deposited with precipitation or through dry deposition. Because sulfate occurs as a dissolved ion, it is mobile in ground water. The maximum value was observed at S1(8.0) and minimum value was observed at S4 (1.6).

3.6. SODIUM

Sodium is a highly soluble chemical element. Sodium is often naturally found in ground water. In water sodium has no smell but it can be tasted by most people at concentration of 200 milligrams per litre or more. The maximum value was observed at S3 (6.369) and minimum value was observed at S9 (0.169).

3.7. POTASSIUM

Potassium concentration in all ground water samples comes under permissible limit. The source of potassium is likely due to silicate minerals, orthoclase, microline, muscovite and biotite in igneous and metamorphic rocks and evaporate deposits gypsum and sulphate release. Main reason for higher levels of potassium into groundwater is due to agricultural activities. The maximum value was observed at S2 and minimum value was observed at S10.

3.8. SODIUM ADSORPTION RATIO (SAR)

On the basis of SAR range, irrigation water can be classified into four class as SAR< 10, 10-18,18-26 and > 26. SAR also influences percolation time of water in the soil. It is also a standard diagnostic parameter for the sodicity hazard of soil, as determined from analysis of bore water extracted from the soil. Sodicity in soil is the

presence of a high proportion of sodium ions relative to other cations. As sodium salts are leached through the soil, some sodium remains bound to clay particles—displacing other cations. Soils are often considered sodic when the amount of sodium impacts soil structure The maximum value was observed at S1 and the minimum value was observed at S3.

3.9. TOTAL HARDNESS

Total hardness of water is obtained by adding calcium and magnesium concentrations and expressed as CaCO3 in mg/L Hardness of water is determined by titrating with a standard solution of ethylene diamine tetra acetic acid (EDTA) which is a complexing agent. If the total hardness is in the range 75 – 150 mg/L, the water will be moderately hard. In this analysis, all the samples are considered to be soft.

3.10. ELECTRICAL CONDUCTANCE

The conductivity of water depends on the concentration of ions and its nutrient status. Based on conductivity values, the water quality can be classified as poor, medium or good. In the present investigation maximum conductivity 5.4 µS/cm was observed at S2 and minimum 0.61 µS/cm micromhos at S5.

3.11. CLASS AND GEOTYPE

The water in Theni District was found to have in four sodic-saline zones C1S1R1, C2S1R1, C2S2R1 and C3S3R1 for adopting soil amelioration strategies for irrigated agriculture. Most of the samples are of magnesium type mixed water.

S.NO	SAMPLES	Total hardness (mg /L)	ELECRTICAL CONDUCTIVITY µS / cm	SAR	CLASS	GEO TYPE
1	S1	15	1.05	3.005	C2S1R1	Na_2SO_4
2	S2	07	5.4	1.001	C4S1R1	$MgCl_2$
3	S3	30	1.64	2.848	C2S1R1	$MgCl_2$
4	S4	24	2.63	0.023	C3S1R1	$MgCl_2$
5	S5	23	0.61	0.107	C1S1R1	$CaSO_4$
6	S6	24	0.64	0.222	C1S1R1	$MgSO_4$
7	S7	20	0.98	0.084	C1S1R1	$CaSO_4$
8	S8	20	1.42	0.108	C2S1R1	$MgSO_4$
9	S9	-	0.92	0.080	C1S1R1	$MgSO_4$
10	S10	15	1.02	0.082	C1S1R1	$MgSO_4$

CONCLUSION:

The well water quality in various places of Theni District in India was analyzed for the parameters such as chloride, calcium, magnesium, pH, electrical conductivity, sodium, potassium, sulphate, sodium attractive ratio, class and geo-type. All the parameters are within the limit prescribed by WHO standard. The hardness of all the samples infer the softness of water and water can be used for kitchen garden and other agricultural purposes.

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EVALUATION OF THE ANTI-OXIDANT AND ANTIFUNGAL POTENTIAL OF THE ETHANOLICEXTRACT OF *MUKIA MADERSPATANA (L.)*

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ABSTRACT

Plants are considered to be the most important treasure in the treatment of diseases. Though modern medicine has revolutionized the entire world, the adverse effect of thesynthetic compounds and affordability to own these medicines are still not been addressed. Plant based medicines are still being used in many of the countries and has gained more importance in the last few years. The chosen plant Mukia Maderspatana (L.) is extracted with ethanol and screened for the presence of phytochemicals. The antioxidant activity was determined by radical scavenging assay and the antifungal activity of the plant extract was tested against two fungal strains A.niger and C.albicans. through the disc diffusion assay. The phytochemical screening proves the presence of Alkaloids, Flavonoids, Tannins and Saponins. The strongest power in the scavenging activity in the ethanolic extract shows about 57% and the zone of inhibition proves that at higher concentration, the plant extract inhibited the growthof the two fungal strains by forming a zone of around 8.5±0.7 for A.niger and 7±0 for C.albicans. This study gives an insight that the chosen plant has a very good antimicrobial andantioxidant activity and further studies are necessary to confirm the active constituents from the Plant.

Key Words – Antioxidant, Medicinal Plants, Antibacterial,Antifungal

1. INTRODUCTION:

Plants have been a valuable source of natural products for maintaining human health especially in the last decade with more intensive studies for natural therapies, Plant-based drugsare being more common in treating many long term disorder (1). According to WHO around 21,000 plant species have the potential for being used as medicinal plants (2).

Many medicinal plants have been proved to contain a good antimicrobial potential andantioxidant potential. The phytochemicals present in the medicinal plants have many antimicrobial properties. (3). Fungal infections are one of the most important dreadful infection that has been increased in the last few years. The increase in fungal resistance, affordability to treatment adverse side effects of the drugs are some of the negative impacts on antifungal drugs. To counteract this issue, the alternative strategy is the natural medicine.

The plant chosen for the present study is *Mukiamaderaspatina* (L).*M.Roem* belongs to the family Cucurbitaceae. It is a climber of tropical and subtropical parts especially in India and Sri Lanka. It has a wide range of phytochemicals such as alkaloids, flavonoids, tannins, saponin, steroids, terpenoids, cardiac glycerides, carbohydrates, phenolic compounds. The wide range of phytochemicals proves the plant has good medicinal activity. Hence the present study is designed to evaluate the antimicrobial and antioxidant activity of the ethanolic extractof *Mukiamaderaspatina* (4)

2. MATERIALS AND METHODS

2.1 COLLECTION OF PLANT MATERIALS

The whole plant of *Mukiamaderaspatina* (L) (Family: Cucubitaceae) were collected from Theni district, Tamilnadu, India and authenticated by a botanist. These plants were thoroughly washed with distilled water and kept in the room temperature at 37˚C for four weeks for drying. The dried plant samples were ground well into a fine

powder. The plant powders were stored in sealed plastic containers at room temperature for further use. 10g of each powdered plant material were soaked separately in 30 ml of Ethanolfor 72 hours with periodic stirring and extracted through Soxhlet apparatus. The extract was passed through Whatman no 1 filter paper and the filtrate obtained was concentrated using a rotary evaporation.

2.2 PHYTOCHEMICAL SCREENING

Qualitative analysis of the phytochemicals were carried out in the ethanolic extracts of plant using standard protocols. (Harbone,1973, Wagner and Elmadfa, 2003). The qualitative analysis of Carbohydrates, Proteins, Alkaloids, Flavonoids and Tannins were assayed (5)

2.3 ANTI-FUNGAL ASSAY

Two fungal strains *A.niger* and *C.albicans* were used. Petri plates containing 20ml potato dextrose agar medium was seeded with 72hr culture of fungal strain (*Aspergillus niger, Candida albicans*) small wells were made concentration of samples of *Mukiamaderaspatina* (500, 250, 100 and 50µg/ml) were added. The plates were then incubatedat 37˚c for 48-72 hours. The anti-fungal activity was assayed by measuring the diameter of theinhibition zone formed around the wells. Amphotericin B (100 units) was used as a positive control. The values were calculated using Graph pad prism 6.0 software (USA).

2.4 ANTIOXIDANT ASSAY (DPPH FREE RADICAL SCAVENGING ASSAY)

DPPH (1,1-diphenyl-2-picryl-hydrazyl) radical scavenging assay was performed to analyse the antioxidant potential of the ethanolic plant extract. In this assay, the antioxidant activities were determined using DPPH, (Sigma-Aldrich) as a free radical. Plant extract of 100µl were mixed with 2.7ml of ethanol and then 200µl of 0.1 % ethanolic DPPH was added. The suspension was incubated for 30 minutes in dark

condition. Initially, absorption of blank sample containing thesame amount of methanol and DPPH solution was prepared and measured as a control (6)**.** Subsequently, at every 5min interval, the absorption maxima of the solution were measured using a UV double beam spectra scan (Chemito, India) at 517nm.

3.RESULTS AND DISCUSSION

Plant extract has very high potential and the chosen plant has good antifungal and antioxidant activity. The preliminary qualitative phytochemical analysis of revealed the presence of various secondary metabolites in the ethanolic extract the plants. The presence of Carbohydrates, Proteins, Alkaloids, Tannins, Saponins, Flavonoids was determined in three different samples and tabulated in **Table 1**

Table 1

3.1 QUALITATIVE PHYTOCHEMICAL ANALYSIS OF ETHANOLIC EXTRACTS OF *MUKIAMADERAS PATINA (L.)*

Phytochemicals	***Mukiamaderas patina (L.)* SER**
Carbohydrates	+
Proteins and Amino acids	+
Alkaloids	+
Tannins	+
Saponins	+
Flavonoids	+

+ - Indicates the presence of the Phytochemicals

Ethanol has the capacity to yield a greater number of phytochemicals. (7). The phytochemicalsuch as, carbohydrate, alkaloids, steroids, saponins, flavonoids and tannin have been detected.These secondary metabolites are useful in cell growth, body building and replacement. These also have antibacterial, anti-inflammatory, immune stimulant, antiviral and detoxification activities.

3.2 ANTI-FUNGAL ACTIVITY

Fungi represents one of the major pathogens in causing diseases and infections. Fungal infections are very hard to treat and they possess the major challenge to the health industry. The plant extract inhibited the fungal pathogens at the concentration of 500 µg/µl and the zone measured was around 8.5±0.7 and 7±0.This clearly indicates that the increase in concentration inhibits the growth of fungal pathogens. The plant extract inhibited the growth of *A.niger* when compared with *C.albicans.* **(Table 2)**

Table 2: **ANTI-FUNGAL ACTIVITIES OF MUKIAMADERSPATANA IN ETHANOLIC EXTRACT AT DIFFERENT CONCENTRATIONS.**

S.NO	Fungal Strains	Plant Extracts	ZONE OF INHIBITION (mm) SD ± MEAN				
			PC	500µg/µl	250µg/µl	100µg/µl	50µg/µl
1	*A.niger*	*Mukiamaderaspotina*	11±0	8.5±0.7	0	0	0
2	*C.albicans*		12±0	7±0	0	0	0

Fig 1 : Antifungal effect of *Mukiamaderas patina on AspergillusNiger*

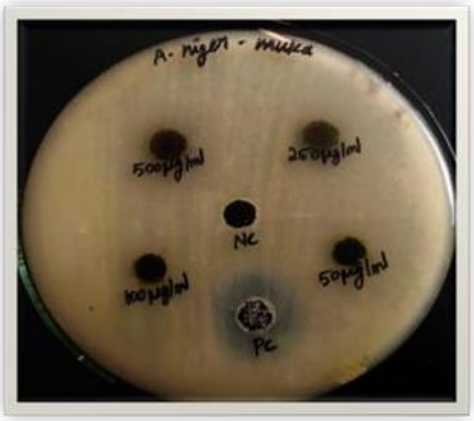

Fig 2: Antifungal effect *of Mukiamaderaspatina on Candida albicans*

3.3 ANTI – OXIDANT ACTIVITY

The Antioxidant shows an important Scavenging activity for free radicals of DPPH (1,1- Diphenyl-2-picryl hydrazyl) is widely used in pathogenesis of many diseases. In *Mukia maderaspatana*, the free radical scavenging activity was highest in ethanolic extract with 56.7%. Ethanol extract of *Mukia maderaspatana* was found to have highest antioxidant activity. The usage of synthetic antioxidant components may show many side effects like toxicity and mutagenic effects, it made an alternative search of naturally occurring antioxidants(8)**. (Table 3)**

Table 3*:* DPPH RADICAL SCAVENGING ASSAY OF MUKIA MADERSPATANA

Minutes	**0**	**5**	**10**	**15**	**20**	**25**	**30**
Ethanolic extract of Mukia Maserspatana	40.5	50.4	51.2	57.5	58.1	59.3	59.3

The present study proves that the chosen Plant extract has very good antifungal and antioxidantactivity. Several phytocompounds are responsible for this activity. In this endeavour, traditional herbal medicines must perforce be granted the benefits of modern science and technology to serve further global needs. Further investigations are required to find the active compounds present in the plant and to develop the plant extract as a efficient drug target

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COMPARATIVE ANALYSIS OF PSEUDO-SMARANDACHE FUNCTION

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ABSTRACT:

In this paper we discuss Smarandache function and two kinds of pseudo-Smarandache functions. And some properties of the pseudo-Smarandache function, $S(n)$. We start with definition of the Smarandache function Z^+, which is the set of all positive integers. Weinvestigated more than fifty terms of each pseudo-Smarandache function, we have proved some interesting results and properties of these functions.

Keywords: prime number, Smarandache function, Pseudo-Smarandache function.

INTRODUCTION

Number theory is a branch of Mathematics concerned with properties of the positive integers. Sometimes called “Higher Arithmetic” an “"The Queen of Mathematics” because of its fundamental place in the discipline. As one of the oldest of Mathematical disciplines, the roots of number theory extend back into antiquity. Problems are often easy to state but extremely difficult to solve, which is the origin of much of their charm. All Mathematicians, amateurs and professionals alike, have a soft spot in their hearts for the “purity” of the integers. When “Fermat's last theorem” was finally proven after centuries of effort the result was discussed on many major news shows in the US. Brief comments also appeared in the major weekly news magazines. The pseudo-Smarandache function Z(n) was introduced by Kashihara.[1].

Divisibility is the backbone of number theory notions such as prime numbers and the

standard number theoretic functions. The Euler phi function, $\phi(n)$ is the number of integers m, where $1 \leq m \leq n$ and m and n are relatively prime. Sum of divisors function, $\sigma(n)$ is the sum of all the positive divisors of n. Number of divisors function, $\tau(n)$ is the number of positive divisors of n. In which everything based on which integers are evenly divisible by others. Divisibility and prime factorizations are intimately related; therefore, the values of number theoretic function can often be computed by formulas based on the prime factorization. For example, if $m = {p_1}^{\alpha_1}{p_2}^{\alpha_2} \ldots\ldots\ldots\ldots {p_n}^{\alpha_n}$, then $\phi(m) = m\left(1-\frac{1}{p_1}\right)\left(1-\frac{1}{p_2}\right)\ldots\ldots\left(1-\frac{1}{p_n}\right)$. In the 1970's a Rumanian Mathematician by the name of Florentin Smarandache created a new function in number theory called the Smarandache function. If $n > 0$, then $S(n) = m$, where m is the smallest number ≥ 0 such that n evenly divides $m!$. $S(n) = min\{m: m \in Z^+, n \mid m!\}$. The most widely studied arithmetical function of Smarandache type is the celebrated Smarandache function $(S(n))$. The Smarandache function is simultaneously a logical extension to earlier function in number theory as well as a key to many future paths of explorations.

1. SMARANDACHE FUNCTION

Definition 1.1

For any integer n ≥ 1, the Smarandache function, S(n), is the smallest positive integer m such that $1 \cdot 2 \cdot \ldots\ldots\ldots \cdot m = m!$ is divisible by n. (i.e.) $S(n) = \min\{m : m \in Z^+, n|m!\},\ n \geq 1$.

Example 1.1

$S(1) = 1$, since $1|1! = 1$,

$S(4) = 4$, since 4 divides4!, and 4 does not divide any of 1! ,2! ,3!.

(i) For any integer, $S(n) = m_0$ if and only if the following two conditions are satisfied.

n divides $m_0!$ and n does not divide $(m_0 - 1)!$

n	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
$S(n)$	1	2	3	4	5	3	7	4	6	5	11	4	13	7	6
n	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
$S(n)$	6	17	6	19	5	7	11	23	4	10	13	9	7	29	5

Lemma1.1

For any integer, $n_1, n_2 \geq 1 => S(n_1, n_2) \leq S(n_1) + S(n_2)$.

2. PSEUDO-SMARANDACHE FUNCTION

Definition2.1

For any integer n $\geq$ 1, pseudo-Smarandache function Z(n) is the smallest positive

integer m such that 1 +2+3+...+m is divisible by n.

That is, $Z(\mathrm{n}) = \min\{\mathrm{m}: \mathrm{m} \in \mathrm{N}: \mathrm{n}| \frac{m(m+1)}{2}\}$

In the following we define pseudo-Smarandache functions of first kind and second kind.

2.2. The properties of pseudo-Smarandache functions

The properties of pseudo-Smarandache functions are available in [3]-[5].

1. The sum 1+2+3+...+m can be replaced by the series of squares of first m natural numbers to get the pseudo-Smarandache functions of first kind.
2. The sum 1+2+3+...+m can be replaced by the cubes of first m natural numbers to get the pseudo-Smarandache functions of second kind.

Values of S(m)

S(1)= 1	S(11)=66	S(21)= 231	S(31)= 496	S(41)= 861	S(51)= 1326
S(2)= 3	S(12)=78	S(22)= 253	S(32)=528	S(42)= 903	S(52)= 1378
S(3)=6	S(13)=91	S(23)= 276	S(33)= 561	S(43)= 946	S(53)=1431

S(4)=10	S(14)=105	S(24)= 300	S(34)= 595	S(44)= 990	S(54)=1485
S(5)=15	S(15)=120	S(25)= 325	S(35)= 630	S(45)= 1035	S(55)= 1540
S(6)=21	S(16)=136	S(26)= 351	S(36)= 666	S(46)= 1081	S(56)= 1596
S(7)=28	S(17)=153	S(27)= 378	S(37)= 703	S(47)= 1128	S(51)= 1326
S(8)=36	S(18)= 171	S(28)= 406	S(38)= 741	S(48)= 1176	S(52)= 1378
S(9)=45	S(19)= 190	S(29)= 435	S(39)= 780	S(49)= 1225	S(53)=1431
S(10)=55	S(20)= 210	S(30)= 465	S(40)= 820	S(50)= 1275	S(54)=1485

Values of Z (n)

Z(1)=1	Z(10) = 4	Z(19) = 18	Z(28)=7	Z(37) = 36	Z(46) = 23
Z (2)=3	Z(11) =10	Z(20) = 15	Z(29)=28	Z(38) = 19	Z(47) = 46
Z (3)=2	Z(12) = 8	Z(21) = 6	Z(30) =15	Z(39) = 12	Z(48) = 63
Z (4) = 7	Z(13) =12	Z(22) = 11	Z(31) = 30	Z(40)=15	Z(49) = 48
Z(5) = 4	Z(14)=7	Z(23) = 22	Z(32) = 63	Z(41)=40	Z(50) = 24
Z(6) = 3	Z(15)=5	Z(24) = 15	Z(33) = 11	Z(42)=20	Z(51) =17
Z(7) = 6	Z(16)=31	Z(25) = 24	Z(34) = 16	Z(43) = 21	Z(52) =39
Z(8) = 15	Z(17) = 16	Z(26) = 12	Z(35) = 14	Z(44) = 32	Z(53)=52
Z(9) = 8	Z(18) = 8	Z(27)=26	Z(36) = 8	Z(45) = 9	Z(54)=27
					Z(55)=10

3. PSEUDO-SMARANDACHE FUNCTION OF FIRST KIND

Definition 3.1

For any integer $n \geq 1$, the pseudo-Smarandache function of first kind, $Z_1(n)$ is the smallest positive integer m such that $1^2 + 2^2 + 3^2 \ldots + m^2$ is divisible by n.

That is, $Z_1(n) = \min\{m: m \in N: n | \frac{m(m+1)(2m+1)}{6}\}$

Values of S (m)

S(1)= 1	S(11)=506	S(21)=3311	S(31)=10416	S(41)=23821	S(51)=50882
S(2)= 5	S(12)=650	S(22)=3795	S(32)=11440	S(42)=25585	S(52)=48230
S(3)=14	S(13)=819	S(23)=4324	S(33)=12529	S(43)=27434	S(53)=51039
S(4)=30	S(14)=1015	S(24)=4900	S(34)=13685	S(44)=29370	S(54)=53955
S(5)=55	S(15)=1240	S(25)=5525	S(35)=14910	S(45)=31395	S(55)=56980
S(6)=91	S(16)=1496	S(26)=6201	S(36)=16206	S(46)=33511	S(56)=60116
S(7)=140	S(17)=1785	S(27)=6930	S(37)=17575	S(47)=35726	
S(8)=204	S(18)=2109	S(28)=7714	S(38)=19019	S(48)=38024	
S(9)=285	S(19)=2470	S(29)=8555	S(39)=20540	S(49)=40425	
S(10)=385	S(20)=2870	S(30)=9455	S(40)=22140	S(50)=42925	

Values of $Z_1(n)$

$Z_1(1)=1$	$Z_1(7) = 3$	$Z_1(13) = 6$	$Z_1(19) = 9$	$Z_1(25) = 12$	$Z_1(31) = 15$	$Z_1(37) = 18$	$Z_1(43)=21$	$Z_1(49) = 24$
$Z_1(2)=3$	$Z_1(8) = 15$	$Z_1(14)=3$	$Z_1(20) = 7$	$Z_1(26) = 12$	$Z_1(32) = 63$	$Z_1(38) = 19$	$Z_1(44) =16$	$Z_1(50) = 12$
$Z_1(3)=4$	$Z_1(9) = 13$	$Z_1(15)=4$	$Z_1(21) = 17$	$Z_1(27)=40$	$Z_1(33) = 22$	$Z_1(39) = 13$	$Z_1(45) =27$	$Z_1(51) = 8$
$Z_1(4) =7$	$Z_1(10) = 4$	$Z_1(16)=31$	$Z_1(22) = 11$	$Z_1(28)=7$	$Z_1(34) = 8$	$Z_1(40)=15$	$Z_1(46) = 11$	$Z_1(52) = 32$
$Z_1(5) =2$	$Z_1(11) = 5$	$Z_1(17) = 8$	$Z_1(23) = 11$	$Z_1(29)=14$	$Z_1(35) = 7$	$Z_1(41)=20$	$Z_1(47) = 23$	
$Z_1(6) = 4$	$Z_1(12) = 8$	$Z_1(18) = 27$	$Z_1(24) = 31$	$Z_1(30) = 4$	$Z_1(36) = 40$	$Z_1(42)=27$	$Z_1(48) = 31$	

Lemma 3.1 $Z_1(n) \geq \max\{Z_1(N) : N \mid n\}$.

Lemma 3.2 Let $n = \frac{k(k+1)(2k+1)}{6}$ for some $k \in N$ then $Z_1(n) = k$.

Proof: The result is the immediate consequence of the fact that no previous value of S(n)

is divisible by k.

Lemma 3.3 It is not possible that $Z_1(m) = m$ for any $m \in N$.

Proof: Let if possible $Z_1(m) = m$. Then by definition m is the smallest of the

positive integer which divides $1^2+2^2+3^2+...m^2$.

Hence m does not divide $1^2+2^2+3^2+... (m-1)^2$.

Let $1^2 + 2^2 + 3^2 + . . . (m - 1)^2 = k$.

So, m divides $k + m^2$. Hence m divides k, a contradiction.

Lemma 3.4 If $S(m)= k$ then $S(m)= Z_1(2k+1)$.

Proof: Here S(m) will stand for the sum of the cubes of first n natural numbers.

4. PSEUDO-SMARANDACHE FUNCTION OF SECOND KIND

Definition 4.1

For any integer n ≥ 1, the pseudo-Smarandache function of second kind, $Z_2(n)$ is the

smallest positive integer m such that $1^3+2^3+3^3...+ m^3$ is divisible by n.

That is, $Z_2(n) = \min\{m: m \in N: n| \frac{m^2(m+1)^2}{4}\}$

Values of S(m)

S(1)= 1	S(11) = 4356	S(21)=53361	S(31)=246016	S(41) = 741321
S(2)= 9	S(12) = 6084	S(22)=64009	S(32)=278784	S(42) = 815409
S(3)=36	S(13) = 8281	S(23)=76176	S(33)=314721	S(43) = 894916
S(4)=100	S(14) = 11025	S(24)=90000	S(34)=354025	S(44) = 980100
S(5)=225	S(15)=14400	S(25) = 105625	S(35)=396900	S(45)=1071225
S(6)=441	S(16)=18496	S(26) = 123201	S(36)=443556	S(46)=1168561
S(7)=784	S(17)=23409	S(27) = 142884	S(37)=494209	S(47)=1272384
S(8)=1296	S(18)=29241	S(28) = 164836	S(38)=549081	S(48)=1382976
S(9)=2025	S(19)=36100	S(29)=189225	S(39) = 608400	S(49)=1500625
S(10)=3025	S(20)=44100	S(30)=216225	S(40) = 672400	S(50)=1625625

Values of $Z_2(n)$

$Z_2(1)=1$	$Z_2(8)=7$	$Z_2(15)=5$	$Z_2(22)=11$	$Z_2(29)=28$	$Z_2(36)=3$	$Z_2(43)= 42$
$Z_2(2)=3$	$Z_2(9)=2$	$Z_2(16)=7$	$Z_2(23)=22$	$Z_2(30)=15$	$Z_2(37)=36$	$Z_2(44)=111$
$Z_2(3)=2$	$Z_2(10)=4$	$Z_2(17)=16$	$Z_2(24)=15$	$Z_2(31)=30$	$Z_2(38)=19$	$Z_2(45)=5$
$Z_2(4)=3$	$Z_2(11)=10$	$Z_2(18)=3$	$Z_2(25)=4$	$Z_2(32)=15$	$Z_2(39)=12$	$Z_2(46)=23$
$Z_2(5)=4$	$Z_2(12)=3$	$Z_2(19)=18$	$Z_2(26)=12$	$Z_2(33)=11$	$Z_2(40)=15$	$Z_2(47)=46$
$Z_2(6)=3$	$Z_2(13)=12$	$Z_2(20)=4$	$Z_2(27)=8$	$Z_2(34)=16$	$Z_2(41)=40$	$Z_2(48)=8$
$Z_2(7)=6$	$Z_2(14)=7$	$Z_2(21)=6$	$Z_2(28)=7$	$Z_2(35)=14$	$Z_2(42)=20$	$Z_2(49)=6$
						$Z_2(50)=4$

Result

- $Z(n) = Z_1(n) = Z_2(n) \geq 1$ for all $n \in N$.
- For p=2, $Z(p) = Z_1(p) = Z_2(p) = p+1$, where p is a prime.
- For p >2, $Z(p) = Z_2(p) = p-1$, where p is a prime.
- For p=2, $Z(p^k) = p^{k+1} - 1$ and $Z_1(p^k) = p^{k+1} - 1$, where p is a prime.
- For $p \geq 3$, $Z_2(p) = 2Z_1(p)$, where p is a prime.
- For $p \geq 5$, $Z(p) = 2Z_1(p)$, where p is a prime.
- If S(n) = k then Z(k) = n and $Z_2(k) = n$.

CONCLUSION:

In this paper the properties of pseudo-Smarandache functions and compared the results on pseudo-Smarandache function and two kinds of pseudo-Smarandache function.

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