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'විමර්ශා' කොළඹ විශ්වවිද්‍යාලයීය දේශීය වෛද්‍ය පීඨයේ මෞලික සිද්ධාන්ත හා ශරීර විඥාන අධ්‍යයනාංශය මගින් පළ කරනු ලබන ශාස්ත්‍රීය සංග්‍රහය යි. එය සම-විමර්ශිත අර්ධ වාර්ෂික විද්‍යුත් සඟරාවක් ලෙසින් වසරකට දෙවරක් එළිදැක්වේ. මෙවර එහි පළමු වෙළුමේ පස්වන කලාපය ඔබ වෙත ගෙන එන්නට ලැබීම ඉමහත් සතුටට කරුණකි. මේ කාර්යය සඵල කර ගැනීම සඳහා ශාස්ත්‍රීය ලිපි සපයමින් දායකත්වය ලබාදුන් සියලුම ලේඛක - ලේඛිකාවන්ට අපගේ කෘතඥතා පූර්වක ස්තුතිය හිමි වේ. පර්යේෂණ සඳහා සහ විද්වත් ප්‍රකාශන සඳහා අපව යොමු කරවන උපකුලපතිතුමා, පීඨාධිපතිතුමා, අංශාධිපතිනිය, සහ අධ්‍යයනාංශයේ සියලු අධ්‍යයන කාර්ය මණ්ඩලය ද අනුස්මරණය කරන්නේ කෘතවේදීව ය. නොයෙකුත් කටයුතු මධ්‍යයේ වුවත් නිස්සරණාධ්‍යාශයෙන් යුතුව ලිපිවල සම-විමර්ශන කටයුතු සිදුකර දෙමින් ශාස්ත්‍රීය අනුග්‍රහය ලබාදුන් සියලුම ආචාර්ය සහ මහාචාර්යවරුන් මෙන්ම මෙහි සංස්කරණ කටයුතු වෙනුවෙන් සහයෝගය ලබාදුන් සංස්කාරක මණ්ඩලය ද අපගේ ගෞරවාදරයට ලක් වේ. විමර්ශා විද්‍යුත් සඟරාවක් ලෙස ප්‍රකාශයට පත් කිරීමට අවශ්‍ය තාක්ෂණික සහාය ලබා දෙන අප පීඨයේ තොරතුරු තාක්ෂණ ඒකකයේ ඒකක ප්‍රධානතුමිය සහ කාර්ය මණ්ඩලය ද අප සිහිපත් කරන්නේ කෘතවේදීව ය. අධ්‍යයනාංශයේ අනධ්‍යයන කාර්ය මණ්ඩලයෙන් ලද අනගි සහාය ද අපගේ පැසසුමට ලක් වේ. විමර්ශා සම-විමර්ශිත අර්ධ වාර්ෂික විද්‍යුත් ශාස්ත්‍රීය සංග්‍රහය ශාස්ත්‍රීය ලෝකයට සිය ඥාන ගවේෂණයට යම් පිටුබලයක් සපයනු ඇතැයි ද එයම අපගේ ප්‍රයත්නයේ ඵලය යැයි ද අපගේ විශ්වාසය යි.

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- **ආචාර්ය අශෝක ගුණසේකර**

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ජ්‍යෝතිර්විද්‍යාවේ ඓතිහාසික පසුබිම පිළිබඳ විමර්ශනාත්මක අධ්‍යයනයක්

අශෝක ගුණසේකර

සංක්ෂේපය

වේද සාහිත්‍ය මෙන් ම ජොතිශ්ශාත්‍රය ද දේවනිර්මාණයක් ලෙසින් සැළකේ. කෙසේ වෙතත් ඉතා ඈත අතීතයේ විසූ ධ්‍යානලාභී ඍෂිවරුන්, බ්‍රාහ්මණයින්, මුනිවරුන් විශ්වයේ පවත්නා සූර්ය චන්ද්‍ර ආදී ග්‍රහතාරකාවන් පිළිබඳ ව කරන ලද පර්යේෂණාත්මක අන්වේශනයන් මගින් තහවුරු කරගත් විශ්ව ඥානසම්භාරය පාදක කරගෙන මෙම විෂයපථය ගොඩනගන්නට ඇත. මෙය ශාස්ත්‍රයක් ලෙසින් ද විද්‍යාවක් ලෙසින් ද ජනප්‍රියත්වයට භාජනය වූවේ ය. දීඝනිකායේ බ්‍රහ්මජාල, කෙවඩ්ඩ වැනි සූත්‍රදේශනාවනහි මෙම ජොතිර්විද්‍යාව ගර්හිත වූවක් ලෙසින් බැහැ කර තිබුණ ද මෙහි ඓතිහාසික ස්වරූපය අධයයනය කිරීමෙන් ප්‍රකට වන්නේ මිනිසාගේ උපතේ සිට මරණය දක්වා ම වැදගත් සෑම ජීවන අවස්ථාවක දීම මෙය භාවිතයට ගත් අනර්ඝ වූ විද්‍යාවක් බව යි. හෝරාශාස්ත්‍රය යන අපර නාමයෙන් ද හැඳින්වෙන මෙම ශාස්ත්‍රය උගත් පුද්ගලයා **දෛවඥයා, ජෝතිර්වේදියා, නැකත්රාළ** වැනි නාමයන්ගෙන් ද හඳුන්වනු ලැබේ. ගණිතමය පදනමක සිට ඉතා තාර්කිකව ගොඩනගා ඇති ජ්‍යොතිෂය ලෝකයේ වියත් ජනනායකයින් පවා අනුගමනය කරන ශාස්ත්‍රයකි. බෞද්ධයින් පිරිත් දේශනා කොට අවසානයේ **'නක්ඛත්ත යක්ඛ භූතානං පාපග්ගහ නිවාරණා**

පරිත්තස්සානුභාවෙන හන්තු තෙසං උපද්දවේ'

යනාදි ලෙස පශ්චාත්කාලීනව ආශිර්වාද ගාථා පවා නිර්මාණය කරගෙන ඇත. ජ්‍යොතිශ්ශාස්ත්‍රයට නින්දා කරන තැනැත්තන් මරණින් මතු රෞරව නිරයේ උපදින බව ජ්‍යොතිෂ ග්‍රන්ථවල දැක් වේ. එපමණක් නො ව ශේෂ වූ කර්මයෙන් අන්‍ය ජන්මවල දී අන්ධ වන්නේ යැයි පරාසර ඍෂිවරයා පවසා ඇත (අන්ධත්වං චාන්‍යජන්මනි). ලංකාවේ භාවිත පිරිත් පොත්වහන්සේට **චන්ද පරිත්ත, සුරිය පරිත්ත** වැනි කොටස් ද ඇතළත් කර සජ්ඣායනා කරනු දක්නට ලැබේ. කෙසේ වෙතත් මෙම ශාස්ත්‍රීය ලිපියෙන් කෙරෙන්නේ ජ්‍යොතිර් විද්‍යාවේ ඓතිහාසික ආමනය අධ්‍යයනය කිරීම යි. ප්‍රධන වශයෙන් ඉන්දියාවේ මෙන් ම ලංකාවේ ද මෙය ඉතා ජනප්‍රිය වූ විෂය පථයකි. විශ්වයට, මිනිසාට මෙන් ම වෙනත් සතුන්ට ද සූර්ය, චන්ද්‍ර ආදි ග්‍රහ වළල්ල ඇති කරන බලපෑම මෙම ශාස්ත්‍රයේ අන්තර්ගත වේ

මූල පද: - ජ්‍යොතිෂය, හෝරා, වරහමිහිර, නක්ඛත්ත, කාලය

හැඳින්වීම

මිනිසා විශ්වයේ සම්භවය ලැබූ දා සිට ම ආකාශයේ දීප්තිමත් ව බබළන තාරකාවන් දෙස දීඝී වේලාවක් බලා සිට ඒවා නිරීක්ෂණය කළ බව උපකල්පනය කළ හැකි ය. මේ සම්බන්ධයෙන් භාරත ඉතිහාසයේ ඉපැරණි සටහන් දැකිය හැක. ජ්‍යෝතිෂ ශාස්ත්‍රය (Astrology) වේද සාහිත්‍යයේ ම අංගයක් එනම් වේදාංගයක් ලෙසින් හඳුනාගත හැකි ය. ලෝකාරම්භයේ පටන් පැවති ජ්‍යොතිෂ ශාස්ත්‍රය බ්‍රහ්මදායදයක් (Creation). වන අතර එය අභිඥාලාභී ඍෂි, මුනි පරම්පරාවෙන් පැවත එන්නකි. මොනරාගේ හිසේ පවතින සිලුව මෙන් ද නාගයන්ගේ ශීර්ෂයේ ඇති මාණික්‍ය මෙන් ද වේදාංග ශාස්ත්‍රයන්ගේ මුදුන්මල්කඩ, ජ්‍යොතිෂය බව **නක්ෂත්‍ර මහා වාදය** නම් කෘතියේ 89 පිටුවේ මෙසේ දක්වයි.

'යථා ශිඛා මයූරාණාම් - නාගානාං මණයෝ යථා

තද්වෙදාංග ශාස්ත්‍රාණාම් - ජ්‍යොතිෂාං මූර්ධනි ස්ථිතම්.'

මුහුර්ත චින්තාමණිය නම් කෘතියේ ද දක්වන්නේ වෙනත් විවිධ ශාස්ත්‍ර විනෝදය, සන්තුෂ්ටිය පිණිස පැවතියත් වෛද්‍ය ශාස්ත්‍රයත් ජ්‍යොතිශ්ශාස්ත්‍රයත් මන්ත්‍ර ශාස්ත්‍රයත් පදයක් පදයක් පාසා විශ්වාසය හා අවශ්‍ය ප්‍රත්‍යසාධනය ගෙන දෙන බව යි.

" අන්‍යානි ශාස්ත්‍රාණි විනොදමාත්‍රං
න කිඤ්චි දොෂාං තු විශිෂ්ටමස්ති
චිකිත්සිතං ජ්‍යොතිෂමන්ත්‍ර වෙදඃ
පදෙ පදෙ ප්‍රත්‍යයමාවහන්ති " යන්නෙන් එය සනාථ වේ.

තාරකා ශාස්ත්‍රයක් වූ ජ්‍යොතිෂය ත්‍රිවේද පාරප්‍රාප්ත බ්‍රාහ්මණයන් විසින් ප්‍රධාන වශයෙන් සකස් කරන ලද්දේ ඒ ඒ කාලයන්හි යාග පූජාවන් පැවැත්විය යුතු දිනයන් හා වේලාවන් නියම කර ගැනීම පිණිස ය.[1] බ්‍රාහ්මණ වේද ධර්මයට අනුව උපනයන කර්මය නො කළ තැනැත්තන්ට ජ්‍යොතිශ්ශාස්ත්‍රය ඉගැන්වීම තහනම් ය.

ජ්‍යොතිෂ ශාස්ත්‍රය **කාලය** පිළිබඳ විද්‍යාවක් ලෙසින් හඳුනාගත යුතු වේ. භාරතයට ග්‍රීසියෙන් හා රෝමයෙන් ලැබුන පිටුබලය හා ආභාසය හේතුවෙන් මෙය වඩාත් ක්‍රමවත් ව සකස් වුණි. එනම් **ගණිතමය විද්‍යාවක්** බවට මෙම ශාස්ත්‍රය ගොඩනැගුනේ ය. විවිධ ජ්‍යෝතිෂ ක්‍රමවේදයන් ලොව පුරා ව්‍යාප්ත ව පැවතිය ද අපගේ අවධානය යොමු වන්නේ ප්ටොමිනීකෘත, **වරාහමිහිර හෙවත් බෘහජ් ජාතක** වැනි කෘතිවලින් නිරූපණය වන පඤ්චාඞ්ග ජ්‍යෝතිෂය වෙත ය. ජ්‍යොතිෂ්‍ය ශාස්ත්‍රය වනාහි තෙවන ඇස ය. එනම් පියවි ඇසට නො පෙනෙන කරුණු නුවණැසින් හඳුනා ගැනීමේ ශාස්ත්‍රයකි. ජ්‍යොතිශ්ශාස්ත්‍රය හදාරන්නා ප්‍රථමයෙන් ම තම ආගමට භක්තිවන්ත වීමත් ලෝකයේ පැවැත්ම නම් වූ ශක්තිය නියෝජනය කරන **විෂ්ණු** දෙවියන්ට ද ධාරණ ශක්තිය නම් වූ විශ්ව ශක්තියට අධිපති **සරස්වතී** දේවියට ද නමස්කාර කරන්නෙකු විය යුතු ය. **පරාශර** ඍෂිවරයා විසින් ශාන්ත භාවයෙන් යුත් මෙම ශාස්ත්‍රය ගුරු භක්තිය ඇති ව, නිහතමානී ව, දේව භක්තිය ද ඇති ව ඉගන ගත යුතු බව පවසන ලදි.[2]

වෛදික සාහිත්‍යයේ පැරණි ම කෘතිය වන ඍග්-වේදයේත් එමෙන් ම අථර්ව-වේදයේත් **සූර්ය, චන්ද්‍ර තාරක, බෘහස්පති, මේෂ, විදුලිය,** වැනි දේවතාවන් වර්ණනා කෙරෙන සූක්ත හෙවත් ගීතිකා වලින් ප්‍රකට වන්නේ ඒවා භක්තිය, ගෞරවය, විමතිය හා භීතිය වැනි මානසික සංකූලතා මත පදනම් වී නිර්මාණය වූ ප්‍රකාශන බව ය. මෙම තාරකා ශාස්ත්‍රයේ ඉතිහාසය **මෙසපතේමියානු** යුගය දක්වා ඈතකට රැගෙන යන **ඒ. එල්. බෂාම්** මහතා එය ඒකාන්ත කොට ඔප්පුකිරීම අසීරු බව පවසයි.[3]

පුරාතන භාරතීය වෙළෙන්දන් රාත්‍රියේ කාන්තාර සහිත මාර්ගවල ගමන් කරද්දී යායුතු දිශාව හඳුනා ගැනීමට නැකත් තරු බලමින් ජ්‍යෝතිශ්ශාස්ත්‍රය ප්‍රයෝජනයට ගත් ආකාරය බෞද්ධ ජාතක කතා සාහිත්‍යයේ දැක් වේ. ඉෂ්ට, අනිෂ්ට, අක්ෂරයන් හා ශුභ මුහුර්තීන් දත් බ්‍රාහ්මණ විශාරදයන් සිද්ධාර්ථ කුමාරයාට නම් තැබීමට සූදානම් වූ අයුරු බෞද්ධ සාහිත්‍යයේ විස්තර වේ. ජ්‍යෝතිර්විද්‍යා විෂයපථයෙහි ගැනෙන **ස්වප්න (සිහින)** පලා'පල කීම ද බුද්ධකාලයේ ඉතා ජනප්‍රිය අංගයකි. අථර්ව-වේදයේ ද **දුඃස්වප්න නාශන** හා **ස්වාපන** සූක්ත ඇතුළත් ය. මහාමායා බිසව දුටු සිහිනය, සිදුහත් බෝසතුන් බුද්ධත්වය ලැබීමට පෙරදා දුටු සිහින, කොසොල් රජතුමා දුටු සිහින දහසය ආදිය හා ඒවා

පිළිබඳ සැපයූ පලා'පල මෙන් ම අනාවැකි ඉතා ප්‍රසිද්ධ ය. පොළොන්නරු යුගයේ **ගුරුළුගෝමී** විසින් රචනා කළ **අමාවතුරේ** 5 වන පිටුවේ සඳහන් වන්නේ " මහබෝසතාණෝ ඇසළ පුණු පොහොයැ **උත්‍රසල** නැකතින් මව්කුස පිළිසිඳ ගත්හු " යනුවෙනි. එහි ම දැක්වෙන්නේ සිදුහත් කුමරා මෙලොවට බිහිවීම **විසා** නැකතින් සිදු වූ බව ය. මෙම යුගයේ ම රචිත විද්‍යාචක්‍රවර්තිගේ **බුත්සරණයේ** 114 පිටුවේ, ප්‍රථම ධර්මදේශනාව සඳහා බුදුරදුන් ධර්මාසනාරූඩ වූයේ **උත්‍රසල** නැකතින් බව සඳහන් ය.

සාකච්ඡාව

බුද්ධකාලයේ දී ජ්‍යොතිර්විද්‍යාව සමාජය තුළ ඉතා තදින් ම පැලපදියම් ව පැවතියේ ය. පැවිදි වූ බ්‍රාහ්මණ වංශික ශික්ෂූන් වහන්සේලා මෙම ශාස්ත්‍රය කෙරෙහි තදින් ම නැඹුරු වූහ. එබැවින් භික්ෂූන් වහන්සේලාට මෙය ලෝකෝත්තර සුවයට බාධාවක් වන හෙයින් ගර්හිත විද්‍යාවක් ලෙසින් හඳුන්වා දීමට බුදුරජුන් ඉදිරිපත් වූ බවක් පෙනේ. දී. නි. කෙවඩ්ඩ සූත්‍රයේ

"එවං විපාකානං චන්දසුරියානං උප්පථගමනං භවිස්සති. එවං විපාකානං නක්ඛත්තානං පථගමනං භවිස්සති " [4]

යනුවෙන් විස්තර කර ඇත්තේ නක්ෂත්‍ර කටයුතුවල යෙදීම විමුක්ති මාර්ගයට අවතීර්ණ වූ භික්ෂූන්ට නුසුදුසු බව ය. කෙවඩ්ඩ සූත්‍රයේ ම ප්‍රකාශිත

"නැකත් වේලාවන් දැක්වීම, චන්ද්‍රග්‍රහණ, සූර්යග්‍රහණ, භූ කම්පා, නැකත් තරුවල පථ ගමනය, අසවල් දිනයෙන් උල්කාපාතය වන්නේය, සඳහිරුගේ ද නැකැත්තරුවල ද උදාවත්, බැසීමත් කෙලෙසීමත් පිරිසිදු වීමත් මේ ආදි ඵල දෙන්නනේ යැයි කියනුවෝ තිරශ්චීන විද්‍යායෙන් හා මිථ්‍යා ජීවයෙන් දිවි පවත්වත් ද"

යන පාඨාර්ථයෙන් ද එය වඩාත් තහවුරු කළ හැක. එහෙත් ලෞකික අවශ්‍යතාවන් පිණිස විශේෂයෙන් වනවාසී භික්ෂූන්ට දිශාව ආදිය දැන ගැනීම පිණිස සූර්ය, චන්ද්‍ර ගමනාදි නැකත් තාරකා පරිහරණය යෝග්‍ය කර ඇති බව **පාලිමුක්තක විනය විනිච්ඡයෙහි** සඳහන් වේ. **"නක්ඛත්ත පදානි උග්ගහෙතබ්බානි. සකලානි වා එක දෙසානි වා"** සියලුම භික්ෂූන් හෝ එක් කොටසක් හෝ නැකත් උගත යුතු ය යනු මෙහි අදහසයි. එහෙත් මෙය වෘත්තියක් වශයෙන් කිරීමට නිවන්මගට පිළිපන් භික්ෂූන්ට සුදුසු බවට බුදුරදුන් අනුදැන වදාරා නැත.

වෛදික මුහුර්ත උපකල්පන ක්‍රි. ව. 1 වන සියවසයේ දී පමණ වඩාත් ක්‍රමානුකූල ව ගොඩනැගී විද්‍යාවක් ලෙසින් උච්ඡස්ථානයකට පත් වූ ආකාරයක් දක්නට ලැබේ. **වරහමිහිර** ආචාර්යවරයාගේ ජීවන සමය පිළිබඳ විවිධ මතවාද විද්වතුන් අතර පවතී. ඔහු විසින් රචිත **වෘහජ්ජාතක** (වරහමිහිර) නම් කෘතිය ජ්‍යොතිෂය සම්බන්ධයෙන් පවත්නා විශිෂ්ටතම ග්‍රන්ථයක් වේ. ආයුර්වේදයේ චරක, සුශ්‍රැත ආදි සංහිතා නාම සේ මෙම කෘතිය ද කර්තෘවරයාගේ නාමයෙන් ම නම් කර ඇත්තේ ඔහුට කෙරෙන ගෞරවයක් ලෙසින් ය. වරහමිහිර පඬිවරයා **වික්‍රම** හෙවත් **වික්‍රමාදිත්‍ය** රාජ සභාවේ විසූ නව රත්නයන්ගෙන් ප්‍රධානියා බව සංස්කෘත සාහිත්‍යයේ දැක් වේ.

" ධන්වන්තරී ක්ෂපණකාමාරසිංහ සංකු - වේතාලභට්ට ඝටකර්පර කාලිදාසඃ

ඛ්‍යාතෝ වරහමිහිරෝ නෘපතෙඃ සභායං - රත්නානි වෛවරරුචිර්නවවික්‍රමස්‍ය" [5]

ධන්වන්තරී, ක්පණක, අමරසිංහ, සංකු, වේතාලභට්ට, ඝටකර්පර, කාලිදාස, ප්‍රසිද්ධියට පත් වරහමිහිර, වරරුචි යන නවදෙනා වික්‍රම රජුගේ රාජසභාවේ විසූ පණ්ඩිත රත්නයෝ වෙති. එහෙත් මෙම ශ්ලෝකය කුමන කෘතියක ඇත්තේ ද යන්න විවාදපන්නයක් වන බැවින් එය බ්‍රාහ්මණ මුඛපාඨයක් ලෙසින් හැඳින් වේ. මෙම ශ්ලෝකය හා නවරත්නය අරභයා යුරෝපීය මෙන් ම ලාංකික වියතුන් රැසක් විවිධ මතවාද ඉදිරිපත් කර තිබේ. වික්‍රම රජු වාසය කළේ ක්‍රිස්තුවර්ෂයට ප්‍රථම පළමුවෙනි ශතවර්ෂයේ මධ්‍ය කාලයේ බව ආචාර්ය මොනියර් විලියම්ස් (**Monier Williams**) සඳහන් කර ඇත. වරහමිහිර **ආදිත්‍යදාස** නම් බ්‍රහ්මණයාගේ පුත්‍රයා බවත්, ස්වකීය පියාණන්ගෙන් මේ වේදාංග ශාස්ත්‍රෝද්ග්‍රහණය කළ බවත්, **කපිත්ථක** ග්‍රාමයේ විසූ බවත් **සූර්ය** නම් දෙවියන්ගේ වරප්‍රසාදය ලද්දකු බවත් අවන්තිය එනම් උජ්ජයිනී දේශයෙහි සෘෂීන් විසින් කරන ලද ශාස්ත්‍ර බලා හදාරා හෝරා

ශාස්ත්‍රය සම්බන්ධ මෙම ප්‍රකරණය කළ බවත් වරහමිහිරයේ අවසන් පරිච්ඡේදයෙහි 9 වන ශ්ලෝකයෙන් පැහැදිලි වේ.

'' ආදිත්‍යදාස තනයස්තදවාප්ත බොධඃ
කිපිත්ථකෙ සවිතෘලබ්ධ වරප්‍රසාදඃ
ආවන්තකො මුනිමතාන්‍යවලොක්‍ය සම්‍ය
සෙසාරං වරහමිහිරො රුචිරාං චකාර'' [6]

28 වැනි පරිච්ඡේදය ලෙස දක්වන ලද්දා වූ උපසංහාර නමින් යුක්ත ශ්ලෝක 10 ද ඇතුළත් ව ශ්ලෝක 408 කින් හෘහත් ජාතක හෙවත් වරහමිහිරය පරිමිතය. සූර්යාදි ග්‍රහයන් ද වශිෂ්ටාදි මුනිවරයන් ද ආදිත්‍යදාස නම් ආචාර්ය පිතෘවරයා ද නමස්කාර කිරීමෙන් ලද ප්‍රසාද බුද්ධියෙන් සංග්‍රහ කළ වරහමිහිරය සූර්වාචාර්යවරයන්ට නමස්කාර කිරීමෙන් සමාප්තිය දකී.[7]
ක්‍රි. ව. 78 දී බලයට පත්වන **කණිෂ්ක** රාජ සමයත් ජෝතිර්විද්‍යාවේ ස්වර්ණමය කාලය ලෙසින් හැඳින්විය හැකි තරමට මෙම ශාස්ත්‍රය ජනප්‍රියත්වයට පත් වූ බවට ඉතිහාසය සාක්ෂි දරයි. බොහෝ ජ්‍යොතිෂ ග්‍රන්ථයන්හි සඳහන් වන ශකරාජ වර්ෂය ආරම්භ වන්නේ ක්‍රි. ව. 78 දී ය.

හෝරා හෙවත් සුබ වේලාව ජ්‍යොතිෂයේ වැදගත් ම සිද්ධාන්තයකි. එම හොරාව සකස් කර ගන්නේ සූර්යෝදාව කෙරෙහි අවධානය යොමු කරමින් ය.

'' භූයොභිඃ පටු බුද්ධිභිඃ පටුධියාං හොරා ඵල ඥප්තයෙ

ශබ්දන්‍යාස සමන්විතෙෂු බහුශඃ ශාස්ත්‍රෙෂු දෘෂ්ටෙෂ්වපි

හොරා තන්ත්‍ර මහාර්ණාවප්‍රතරණේ භග්නොදය මනාමහං

ස්වල්පං වෘත්ත විචිත්‍රමර්ථ බහුලං ශාස්ත්‍රප්ලවං ප්‍රාරහෙ

හොරෙත්‍ය හොරාත්‍ර විකල්පමෙතෙ - වාඤ්ජන්ති පූර්වාපර වර්ණ ලොපාත්

කර්මාර්ජිතං පූර්වභවෙ සදාදි -යත් තස්‍ය පඬ්ක්තිං සමහිව්‍යනක්ති '' [8]

යන ප්‍රකාශයන්ගෙන් ජ්‍යොතිෂය යනු කවරක්දැයි පැහැදිලි වේ. එනම් බෙහෝ සෙයින් චතුර නුවණක් ඇති පණ්ඩිතයන් විසින් තියුණු නුවණක් ඇති අයට, හෝරා ඵල දැනගැනීම පිණිසත් බොහෝ ශබ්ද ශාස්ත්‍ර විද්‍යාවන් හදාරා තිබුණත් **හෝරා ශාස්ත්‍රය** නැමති සාගරයෙන් එතර වන්නටත් බිඳුණු උත්සාහ ඇත්තන්ට, මිහිරි වෘත්තවලින් යුතු ව වරහමිහිරය ඉදිරිපත් වේ. හෝරා යන වචනය **දිවා - රෑ** යන අර්ථ ඇති **''අහෝරාත්‍රි''** ශබ්දයාගේ මුල් අක්ෂරය වූ **'අ'** යන්න හා අග අක්ෂරය වූ **'ත්‍රි'** යන්න ලොප්වීමෙන් එනම් මැද අක්ෂරයන් එකතුවීමෙන් **හෝරා** යන වචනය සැකසී ඇති බව එහි කියැවේ. පූර්ව භවයන්හි යම් කර්මයක් රැස්කරන ලද්දේ ද ඒ කර්මයාගේ විපාකයන් **හෝරා** ශාස්ත්‍රයෙන් මනාව ප්‍රකාශ වන බව ද වරහමිහිර ආචාර්යවරයා වැඩිදුරටත් පවසයි. එනම් ජ්‍යොතිෂයේ දී සූර්යයාට හා චන්ද්‍රයාට ප්‍රමුඛස්ථානයක් හිමි වන බව මෙයින් ගම්‍ය වේ. රාශිය, හෝරාව, දෙර්කාණය, නවාංශකය, ද්වාදශාංකය, ත්‍රිංශාංශකය යන මොවුන් යම් ග්‍රහයකුගේ වේ ද එය ඒ ග්‍රහයාගේ **වර්ගය** වේ. ලග්නයට ද රාශියෙන් අර්ධයකට ද යන දෙකට ම **හෝරා** යන නාමය ලැබේ. සිංහල දෙපැය හමාරක් නොහොත් ඉංග්‍රීසි පැයක් **හෝරා** යන නාමයෙන් හඳුන්වනු ලැබේ. රාශියෙන් අර්ධයක් උදාවීමට සාමාන්‍යයෙන් හෝරාවක පමණ කාලයක් ගත වන බැවින් **රාශ්‍යර්ධයට** ද හෝරා යන නම වූ බව පෙනේ. [9]

වෛදික ජනයා අතර ජ්‍යොතිර් විද්‍යාව කෙතරම් ජනප්‍රිය වූයේ ද යන්නට අථර්ව-වේදයේ දැක්වෙන කාල සූක්ත හා නක්ෂත්‍ර සූ**ක්ත**[10] (**අථර්ව-වේද නක්ෂත්‍ර සූත්‍ර 19. 07, 19. 08**) උචිත නිදර්ශනයන් වේ. **කාලය** නමැති පුරුෂයාගේ අවයවයන්ට ජ්‍යොතිෂයේ රාශි දොළහ සම්බන්ධ කර ඇත. එනම් මේෂ - හිස, වෘෂභ - මුහුණ, මිථුන - උරය, කටක - හෘදය, සිංහ - බඩ, කන්‍යා උකුල, තුලා - වස්තිය, වෘශ්චික ලිඬගය, ධනු - දෙකලවා, මකර - දෙදන, කුම්භ - කෙණ්ඩා දෙක, මීන - දෙපතුල යන ක්‍රමයට රාශි

දොළහ **කාල පුරුෂයාගේ** අවයවයන්ට සම්බන්ධ වේ. චන්ද්‍ර කලාවන් අනුව යාග පූජාවන් පැවැත්වීමට උචිත ශුභ මුහුර්තිය සොයා ගැනීමට වෛදික ජ්‍යොතිශ්ශාස්ත්‍රඥයන් සමත් වූ බව උක්ත සූක්ත අධ්‍යයනයෙන් පැහැදිලි වේ.

කෙසේවෙතත් වෛදික ඉගැන්වීම් පදනම් කරගත් ජ්‍යෝතිශ්ශාස්ත්‍රය, සංවර්ධනය වෙමින් ආයුර්වේදයට ප්‍රවේශ වන අතර ආයුර්වේදය හා මහායානික බුදුදහම මාර්ගයෙන් ද ලංකාවේ රජවරුන්ට උපදෙස් සැපයූ බමුණන්ගේ මාර්ගයෙන් ද මෙම ශාස්ත්‍රය ශ්‍රී ලංකාවේ ප්‍රචලිත වී ඇත. **රාවණ** ද ජ්‍යොතිෂයේ පාරප්‍රාප්තයකු ලෙස සැළකේ. විජයාගමනයත් මහින්දාගමනයත් අරභයා වන ජ්‍යොතිෂමය කරුණු ද රැසක් පවතී. මහමෙව්නාවේ ශ්‍රී මහා බෝධින්වහන්සේ රෝපණය කිරීමට මත්තෙන් ප්‍රාතිහාර්ය පාමින් ආකාශයට නැග හිරු අස්තයට ගිය පසු භූමියෙහ් පිහිටියේ රුක් රෝපණය සඳහා ජ්‍යොතිෂයේ දක්වන ප්‍රබල නැකතක් වන **රෙහෙණ** නැකතින් බව බෝධිවංශයේ 124 පිටුවේ සඳහන් වේ. ප්‍රාග් මහින්ද යුගයේ සිට ලංකාවේ පැවති ජ්‍යොතිෂ ශාස්ත්‍රය අනුරාධපුර යුගයේ සිට පැවති බවට මහාවංශය සාක්ෂි දරයි. කෘෂිකර්මාන්තයට බෙහෙවින් උචිත **අනුර** නැකතින් අනුරාධගාමය (අනුරාධපුර) ද **මා** නැකතින් මාගම ද **රෙහෙණ** නැකතින් රුහුණු ද ජනාවාස ආරම්භ වූ බවට ඓතිහාසික සාධක ඇත. මහාවංශයට අනුව **පඬුවස්දෙව්** රජතුමාගේ දියණියක වූ **චිත්‍රා** කුමරියට **පණ්ඩුකාභය** නම් කුමරෙකු උපදින බවටත් එම කුමරා තම මයිලනුවන් මරා රජකම ලබාගන්නා බවටත් ජ්‍යොතිශ්ශාස්ත්‍රඥයෝ අනාවැකි පල කළහ. එම කුමරා ශිල්ප ශාස්ත්‍ර හදාළේ පණ්ඩුල නම් බ්‍රාහ්මණයෙකු ගෙනි. **දඹදෙණිය** යුගයේ රජකළ කලිකාල සර්වඥ පණ්ඩිත දෙවන පරාක්‍රමබාහු (ක්‍රි. ව. 1225 - 1269) රජු විසින් රචනා කරන ලද **කව්සිළුමිණ** මහා කාව්‍යයෙන් ප්‍රකට වන්නේ මේ රජතුමාට ජ්‍යොතිෂය පිළිබඳ ව මනා දැනුමක් පැවති බව ය.

''ම දූ ඒ සඳු රෝහිණිය මෙන් - නොවෙන් වූ නම්

සවණ නෙත මන තමා - සැණකෙළියැ පා බඳනේ '' [11] (199 ගීය)

මෙම ගීයෙන් මදු රජු තම දියණිය වූ පබාවතිය කුස රජුට ගැලපෙන ආකාරය සමාන කරන්නේ රෙහෙණ නැකත තරම් සඳුට ගැලපෙන වෙනත් නැකතක් නොමැති බැව් ප්‍රකාශ කරමිනි. නැකත් විසිහතෙන් සඳු, ඉතාමත් ම ප්‍රබල වන නැකත රෙහෙණ ය. රෙහෙණ නැකත යෙදෙන්නේ වෘෂභ රාශිය තුළ වීම මෙයට හේතුවයි. වෘෂභ රාශිය සඳුගේ උච්ච රාශිය ද වේ. සඳුට රෙහෙණ නැකත මනාව සුසංයෝග වන අයුරින් පබාවතිය සඳුටත් කුස රජු රෙහෙණ නැකතටත් සමාන කර කව්සිළුමිණ කතුවරයා ඉහත ගීයෙන් දක්වා ඇත. මේ සුසංයෝගය මදු රජතුමාගේ කණත් නෙතත් සිතත් සැණකෙළියක් බවට පත් කරන්නේ එබැවිනි. දඹදෙණිය යුගයේ රචනා වූ **දෛවඥකාමධේනුව** නම් නක්ෂත්‍ර පුස්තකය ඉතා ජනප්‍රිය විය.

සිංහල සන්දේශ කාව්‍ය විමසා බැලීමේ දී කෝට්ටේ යුගයේ මෙම ශාස්ත්‍රය වඩාත් සැළකිල්ලට භාජනය වී ඇති බව පැහැදිලි වේ. සැළලිහිණි සන්දේශය, ගිරාසන්දේශය, හංස සන්දේශය ආදියෙහි දක්වෙන තොරතුරු අනුව එවක පාරිවේණික සිසුහු වෛද්‍ය ශාස්ත්‍රයත් ජ්‍යොත්ශ්ශාස්ත්‍රයත් මැනවින් ප්‍රගුණ කළහ.

ගිරාසන්දේශ කතුවරයා තම කාව්‍යයෙහි දූතයා වූ ගිරවාට 57 වන පද්‍යයෙන් පවසන්නේ, පුරාණ ඍසිවරුන් පැවසූ පරිදි තොපගේ ගමනට (යතුරට) ඉරිදා දින අවයෝග ආදි දොස් නැති සිකුරු සහ ගුරු යන ග්‍රහයින් දෙදනා කන්‍යා (කුමරි) රාශියෙහි සිටිය දී රවිගේ නැකත එනම් උත්‍රපල් නැකතෙහි චන්ද්‍රයා පිහිටියා වූ සුබ මොහොතින් කරණීය මෙත්ත සූත්‍රය සිහි කරගෙන පිටත්ව (වඩු) යන ලෙස ය.

''පොරණ රැසින් කී තොප යතුරට පවර

ලද නිදොසින් රිවි දින කනත දිනකර

කුමරි රැසින් කිවි සුගුරු සිටි නො හැර

මිතුර තොසින් වඩු සිහිකර මෙත් සුතුර ''[12]

තොටගමුවේ ශ්‍රී රාහුල ශිමියන් ද තම දූතයා වූ සැළලිහිණියා පිටත් කර යවන්නේ ද ගිරා කතුවරයා මෙනි. ''යහළුව. අවට ඒකාගෝක කරගෙන නැගෙන හිරින් උදෑසන සුරගුරු (බ්‍රහස්පති ග්‍රහයා) උදා වෙද්දී (කටක රාශියේ) අස්විද නැකතේ සිට (මේෂ රාශියේ) සිට චන්ද්‍රයා අහස මුදුනට පැමිණෙද්දී

සතුටු වූ සිතින් යුතු ව තමාගේ කුලදේවතාවන් සිහිකරගෙන මේ පුරයෙන් ගමන් ඇරඹීම තොපට යෙදේ '' යනුවෙන් මෙසේ 15 වන පද්‍යයෙන් පවසා ඇත.

''උදේ සැපත් සුරගුරු අළුකර අවට
සඳේ මුදුන් වන අස්විද නැකත සිට
නදේ සිතින් තම කුල දෙවිය සිහි කොට
යෙදේ ගමන් යහළුව මෙපුරෙන් තොපට ''

රාශි චක්‍රය වටා ඇති එක් නැකතක් පාද හතරකට බෙදා පාද 108 ක් සකස් වන අතර එක් නැකතකට නැකත්පාද නවයක් (9) වෙන් කරයි. එනම් නැකත් දෙකක් හා ඉදිරි නැකතේ එක් පාදයක් එක රාශියකට අයත් වේ. මෙය උදාහරණ සහිත ව තව දුරටත් මෙසේ පැහැදිලි කළ හැකි ය. මේෂ රාශියට අස්විද නැකතත් බෙරණ නැකතත් කැති නැකතේ එක් පාදයකුත් ඇතුළත් වන අතර වෘෂභ රාශියට කැති නැකතේ 2, 3, 4 යන පාද තුනත් රෙහෙණ නැකතත් මුවසිරස නැකතේ 1, 2 යන පාදයනුත් අයත් වේ. අඟහරුය, සිකුරුය, බුදය, සඳුය, රවිය, බුදය, සිකුරුය, කුජය, බ්‍රහස්පතිය, සෙනසුරුය, සෙනසුරුය, බ්‍රහස්පතිය, යන ග්‍රහයෝ පිළිවෙළින් මේෂාදි රාශි දොළහට අධිපති වෙති. එසේ ම මේෂාදි නවාංශකයන්ට ද අධිපති වන බව වරහමිහිරයේ පස්වන පිටුවේ පැහැදිලි කර ඇත. එනම් මේෂ රාශියට අඟහරු ද වෘෂභයට සිකුරු ද මිථුනයට බුද ද කටකයට සඳු ද සිංහයට රවි ද කන්‍යාවට බුද ද තුලාවට සිකුරු ද වෘශ්චිකයට අඟහරු ද ධනුවට බ්‍රහස්පති දමකරයට සෙනසුරු දකුම්භයට සෙනසුරු ද මීනය රාශියට බ්‍රහස්පති ද අධිපති වෙති. මෙම රාශි ඒ ඒ ග්‍රහයන්ට ස්වක්ෂේත්‍ර රාශි වෙති.

පෞරාණික රාශි නාම විමර්ශනය කිරීමෙන් ඉන්දු දේශවාසීන් හෙල්ලීන හෙවත් ග්‍රීකවරුන්ගෙන් ජ්‍යොතිශ්ශාස්ත්‍රය හදාරන්නට ඇතැයි මතවාද පවතින බව පැහැදිලි වේ. වරහමිහිරයේ 8 ශ්ලෝකය මීට නිදර්ශන සම්පාදනය කර ඇත.

''ක්‍රිය තාවුරි ජිතුම කුලීර
ලෙය පාථොන ජූක කෞර්පාඛ්‍යඃ
තෞක්ෂික ආකොකෙරො
භෘද්‍රොගශ්චාන්ත්‍යහං වෙන්ථම් ''

මෙහි ඇති කුලීර සහ අන්ත්‍යහ යන නම් දෙක හැර සෙසු නාම සියල්ල ම ග්‍රීක ශබ්ද නාමයන් ය. ඒ අනුව රාශි නාම මෙසේ ය. ක්‍රිය යනු මේෂ රාශිය වේ. තාවුරි (වෘෂභ), ජිතුම (මිථුන), කුලීර (කටක), ලෙය (සිංහ), පාථොන (කන්‍යා), ජූක (තුලා), කෞර්පි (වෘශ්චික), තෞක්ෂික (ධනු), ආකොකෙර (මකර), භෘද්‍රොග (කුම්භ), අන්ත්‍යහ (මීන), යන මෙම නාම රාශි දොළහට ව්‍යවහාර කර ඇත.

මේෂ, මිථුන, සිංහ, තුලා, කුම්භ, ධනු යන රාශි හය ක්‍රූර රාශි බව ද **වෘෂභ, කටක, කන්‍යා, වෘශ්චික, මකර, මීන** රාශි හය සෞම්‍ය රාශි බව ද ජෝතිශ්ශාස්ත්‍රයේ සඳහන් වේ.[13] සෞම්‍ය රාශිවල උපන් අය සෞම්‍ය ස්වභාවයෙන් යුතු බවත් ක්‍රූර රාශිවල උපන් අය ක්‍රූර ගති ලක්ෂණ ඇති අය බවත් 'සෞම්‍ය ලග්නෙතු සෞම්‍යස්සාත් - ක්‍රූරඃ සාත් ක්‍රූර ලග්නකෙ' යනුවෙන් අග්නි පුරාණයේ ද සඳහන් වේ.

මීට අමතර ව රාශියට අධිපති වර්ණ සහ ග්‍රහයන්ට අධිපති වර්ණ ඇත. සූර්යයා තඹ පැහැයටත්, චන්ද්‍රයා සුදු පැහැයටත්, අඟහරු තද රතු පැහැයටත්, බුධ ග්‍රහයා ගිරා (කොළ) වර්ණයටත්, බ්‍රහස්පති කහ පැහැයටත්, සිකුරු චිත්‍ර (විසිතුරු) වර්ණයටත් සෙනසුරු කලු වර්ණයටත් අධිපති වේ. ග්‍රහ පූජාවේ දී ඒ ඒ ග්‍රහයාට අයත් වර්ණයෙන් යුතු මල් ගත යුතු වෙයි. නැතිවුණ බඩු බාහිරාදියෙහි වර්ණය දැනගැනීමට ද මෙය ප්‍රයෝජනවත් බව ජ්‍යෝතිෂයේ කියැවේ. **රවිට ගිනි දෙවියා අධිපති වන අතර සඳුට ජල දේවතාවා නොහොත් වරුණ දෙවියන් ද, කුජට ස්කන්ධ දෙවියන් ද, බුදට විෂ්ණු දෙවියන් ද, ගුරුට ශක්‍ර දේවේන්ද්‍රයා ද, සිකුරුට ශක්‍රයාගේ භාර්යාව වන ඉන්ද්‍රාණී දෙවඟන ද, සෙනසුරුට බ්‍රහ්මයා ද අධිපති වේ.** ඒ ඒ ග්‍රහදෝෂයන් සඳහා ඒ ඒ දෙවි දේවතාවන් වෙත පූජා පැවැත්වීම සිදු වේ. **උතුරට බුධ ද දකුණට අඟහරු ද, නැගෙනහිරට හිරු ද බටහිරට සෙනසුරු ද, ඊශාන දිසාවට බ්‍රහස්පති ද නිරිතට රාහු ද, ගිනිකොනට සිකුරු ද වයඹට සඳු ද අධිපති වේ.** වැදගෙයි දොර තිබෙන දිශාව දැන ගැනීමටත්, සොරුන් බඩු රැගෙන ගිය දිශාව දැනගැනීමටත් ආදි කරුණු සඳහා මෙම දිශා දැනගැනීම ප්‍රයෝජනවත් වන බව ජ්‍යොතිෂ මතය වේ. ඒ ඒ ග්‍රහයන්ට ආවේණික ලක්ෂණයන් හා ස්වරූපයන් පුද්ගලයා තුළින්

නිරූපණය වේ. ග්‍රහ දෘෂ්ටි, ග්‍රහ බල, ග්‍රහ යෝග, ග්‍රහයන්ගේ මිත්‍රා'මිත්‍ර බව ආදිය දැනගැනීම වැදගත් වේ.[14] ජ්‍යෝතිශ්ශාස්ත්‍රය පිළිබඳ විශාරදයකුට හා ප්‍රවීණයකුට කේන්ද්‍ර අධ්‍යයනයෙන් උපන් පුද්ගලයාගේ වර්ණය දැනගැනීමටත්, ගොඩෙහි දියෙහි පක්ෂීන්ගේ උත්පත්තිය කීමටත්, දුර්ලබ ගණයේ ශාක හටගැනීම කීමටත්, භූමියේ ස්වරූපය හඳුනා ගැනීමටත් හැකියාව ඇති බව සඳහන් ය. ගැබ්ගැනීම, දරුවන් හටගන්නා යෝග, මාතෘ පිතෘ දෙපක්ෂට ම වන සුබා'සුබ, ගර්භණියට මරණ ඇතිවීම, කුසේ සිටින දරුවාගේ සුවපත් බව, නපුංසක යෝග, නිවුන්දරු යෝග, ගර්භිණිය සම්බන්ධ මාසාධිපතිට අනුව අඳ, ගොළු, බිහිරි දරු උපත්, අත් පා මිටි - දිග දරු උපත්, දරු ප්‍රසූතිය ප්‍රමාදවීමේ දෝෂ, විවිධ ජන්ම යෝග, වැදූ ගෙයි ස්වභාවය, උපන් තැනැත්තාගේ දේහ ලක්ෂණ, ආයුෂ ප්‍රමාණය, අධ්‍යාපනය, විවාහය, දරුපල ආදිය ප්‍රකාශ කිරීමට කුශලතාව ඇත.[15] සෑම සුබ මුහුර්තියක් ම සකස් කරන්නේ සූර්යෝදාව මුල් කරගෙන ය. සෑම නැකතකට ම **ගණ, යෝනි, වෘක්ෂ ලිඬිග, නාඩි, පක්ෂි, ගෝත්‍ර, වර්ණ, රජ්ජු** සහ **භූත** යන චක්‍රය ඇත. මෙයින් බොහෝවිට පුද්ගලයන් මානසික ව බාධාවන්නට ඇති හේතු සාධක ද පැහැදිලි කරයි. විශේෂයෙන් පොරොන්දම් ගැලපීමේ දී මේවා ඉතා වැදගත් වේ. ජ්‍යෝතිෂ්ශාස්ත්‍රය ලොවට බිහි කළ ඍෂිවරුන් රවි, චන්ද්‍ර, කුජ ආදි ග්‍රහයන්ගෙන් ඇති වන කරදරවලින් හා අපලවලන් ආරක්ෂාවීමට ශාන්තිකර්ම රැසක් අනු දක්වා තිබේ. ඒ ඒ ග්‍රහයන්ට අනුව අපල කරන අය, පිහිට පැතිය යුතු දෙවියන්, කළ යුතු බලි ශාන්තිකර්මයන්, ග්‍රහ දාන, ස්නානයට ඖෂධ, පූජා කළ යුතු මල්, පැළඳිය යුතු පාෂාණ වර්ගය, පැළඳිය යුතු ලෝහ, පැළඳිය යුතු යන්ත්‍ර, හිමි වෘක්ෂය යන කාරණා වෙන වෙන ම ජ්‍යෝතිෂයේ දැක් වේ.

නිගමනය

මෙසේ විමසා බලන කල ජ්‍යොතිෂයට ඉතා දීර්ඝ ඓතිහාසික පසුබිමක් පවතින අතර එය සූර්යයා මූලික ව ග්‍රහ තාරකා කේන්ද්‍ර කරගත් ගණිතමය විද්‍යාවක් ලෙසින් හඳුනා ගත හැකි ය. ජ්‍යොතිෂයේ ඉගැන්වෙන ග්‍රහ වස්තූන් ආයුර්වේදයේ දැක්වෙන ත්‍රිදෝෂ තත්ත්වයන්ට සම්බන්ධ ව පවතී. සූර්යයා හා චන්ද්‍රයා පුද්ගලයාගේ මනස හා සංවේදනයන්හි ක්‍රියාකාරීත්වය විෂයෙහි බලපෑම් ඇති කරයි. චන්ද්‍රයා සෙම අධික වීම, සූර්යයා පිත අධික වීම කෙරෙහි බලපෑම් ඇති කරවයි. කුජ හෙවත් අගහරු, රක්තය හා අක්මාව කෙරෙහි බලපාන අතර පිත්තය හෙවත් කළු කෙරෙහි සම්බන්ධතා දක්වයි. මාංශපේශි දුර්වල වීම කෙරෙහි බලපෑම් ඇති කරන්නේ සෙනසුරු හෙවත් ශනි ය. ශුක්‍ර හෙවත් සිකුරු ග්‍රහයා, ශුක්‍ර ධාතුව හා වෘෂණ කෝෂ කෙරෙහි මෙන් ම ඩිම්බකෝෂ විෂයෙහි බලපෑම් ඇති කරයි. භාරතයේ වෛද්‍යාචාර්යවරයකු වන වසන්ත ලාඩ් මහතා විසින් Aurveda, the Science of Self -Healing යන කෘතියේ කාලය හා ත්‍රිදෝෂ අතර පවත්නා සම්බන්ධයත් ග්‍රහයන් හා දෝෂ අතර පවත්නා සම්බන්ධයත් මැනවින් පෙන්වා දී ඇත. පුද්ගලයකුගේ උපන් වේලාව අනුව ලග්නය, නවාංශකය, නැකත, නැකත් පාදය, දශාව වැනි කරුණු ගණනය කර කේන්ද්‍රපත්‍රය හෙවත් වේලාපත්කඩය සකසා ගැනේ.

ආශ්‍රිත මූලාශ්‍ර

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EXPLORING THE NUTRITIONAL AND HEALTH BENEFITS OF TRADITIONAL KANDYAN RICE VARIETIES AND SELECTED GRAINS

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ABSTRACT

This research explores the nutritional and therapeutic properties of traditional Kandyan rice varieties and grains, including finger millet, proso millet, foxtail millet, maize, and *Oryza sativa*. These grains have played a vital role in Sri Lankan cuisine and traditional medicine, but their contemporary relevance has been overshadowed by modern agricultural practices. A mixed-methods approach was employed, combining interviews with 17 individuals in the Kandyan region with a systematic review of peer-reviewed literature (2014-2024).

These grains are rich in essential nutrients. Finger millet is high in protein and fiber, with calcium and iron. Proso millet provides carbohydrates, phosphorus, and potassium. Foxtail millet offers protein, carbohydrates, fiber, calcium, and iron. Maize is an energy source with carbohydrates, moderate protein, and fiber. Dark fine rice (Kalu Heenati) provides carbohydrates, protein, fiber, iron, and zinc.

Traditional medical texts highlight their diverse applications. Finger millet balances *Kapha Doṣa* Foxtail millet heals fractures and improves sense of taste. Proso millet treats dysentery. Maize balances *Kapha* and *Pitta Doṣa*. *Kalu Heenati* is recommended for lactating mothers, traditionally used to boost sexual potency and manage diabetes. Modern research supports these traditional uses, showing benefits for blood sugar, antioxidant capacity, digestion, and chronic diseases.

Traditional and modern evidence support the value of these grains for a balanced and healthy diet, highlighting their therapeutic properties. Finger millet shows antioxidant and antidiabetic properties, with potential for managing blood sugar and reducing chronic disease risk. Foxtail millet aids digestion and may help prevent cancer. Proso millet, rich in antioxidants, may contribute to heart health and diabetes management. Maize provides essential nutrients and antioxidants. Dark fine grain rice (*Kalu Heenati*) offers carbohydrates, protein, fiber, and minerals, with potential antioxidant benefits, and is traditionally recommended for lactating mothers. This research highlights the importance of revitalizing interest in these traditional grains for their nutritional, cultural, and environmental benefits. Promoting their consumption can support healthier communities and a more sustainable food system.

Key words: Health Benefits, Kandyan Rice Varieties, Millets and Grains, Nutritional Profiles, Traditional Dietary Practices

INTRODUCTION

Dietary practices are deeply embedded in the cultural fabric of societies, extending far beyond mere patterns of consumption. They serve as a profound expression of cultural identity, encapsulating the historical continuity and collective wisdom that has been passed down through generations. These practices, rooted in tradition, often embody a wealth of knowledge regarding the nutritional value of foods and their role in maintaining health and well-being. In many regions around the world, traditional diets are revered not just for their ability to provide sustenance but also for their integral role in sustaining the health of communities, shaping social structures, and reinforcing cultural values.

Sri Lanka, with its rich tapestry of cultural history and diverse agricultural heritage, presents a compelling case for exploring the intersection of tradition, nutrition, and health. The country's agricultural practices, which have evolved over millennia, are closely tied to its cultural identity, particularly through the cultivation and consumption of rice. Rice is more than just a dietary staple in Sri Lanka; it is a symbol of life and prosperity, deeply ingrained in the social and cultural rituals of the people. The traditional dietary practices associated with rice, particularly those from the Kandyan era, offer a unique lens through which to study the ways in which food, culture, and health are interwoven.

This study specifically delves into the dietary practices of the Kandyan era, a significant period in Sri Lankan history that is renowned for its distinctive cultural and agricultural practices. The research focuses on seven specific rice varieties that have been central to the diet during this era: *Diya Bath, Sunusal Bath, Irigu Bath, Thanahal Bath, Kurakkan Kiribath, Meneri Bath, and Meneri Kiribath.* Each of these rice varieties has its own unique method of preparation, flavor profile, and cultural significance. For example, *Kurakkan Kiribath*, made from a mixture of finger millet and rice, is traditionally prepared during special occasions and is revered for its nutritional density and health benefits. Similarly, *Sunusal Bath* and *Thanahal Bath* are known for their specific roles in ceremonial functions, symbolizing abundance and purity.

These rice varieties have been staples in the diet of Sri Lankans for centuries, surviving the test of time despite significant changes in agricultural practices and the global food landscape. The encroachment of modern agricultural practices, driven by the demands of globalization, has led to the decline of many traditional crop varieties in favor of high-yield, commercially viable alternatives. However, these traditional rice varieties continue to be cherished, particularly in rural communities where the connection between food, culture, and health remains strong. These communities have preserved these practices not only as a means of sustenance but also as a way of maintaining their cultural identity and ensuring the health of their members.

In addition to exploring these traditional rice varieties, the study also broadens its scope to investigate other grains that have been historically significant in the region. These grains include finger millet, proso millet, foxtail millet, maize, and the *Kalu Heenati* (the dark fine rice) more widely known Oryza sativa (common rice). Each of these grains has a unique history of cultivation in Sri Lanka and has been consumed for its distinct nutritional properties and ability to thrive in diverse environmental conditions. For example, finger millet, known locally as *Kurakkan*, has been a vital crop in arid regions due to its resilience to drought and poor soil

conditions. It is celebrated for its high nutritional value, particularly its rich content of calcium, iron, and dietary fiber.

Similarly, proso millet and foxtail millet have been valued for their quick growth cycles and adaptability to different climates, making them essential in times of environmental stress. Maize, introduced to Sri Lanka during the colonial period, quickly became integrated into local agricultural practices and diets due to its versatility and nutritional benefits. *Oryza sativa*, the most commonly consumed rice variety, continues to be a dietary staple, but its role is often complemented by these other grains, especially in traditional and rural settings.

Modern nutritional science has begun to validate the health benefits of these grains, highlighting their potential in managing chronic diseases and improving overall health outcomes. For instance, finger millet has been recognized for its antidiabetic properties, as it helps in regulating blood sugar levels, making it an excellent dietary choice for managing diabetes. Proso millet has been associated with cardiovascular benefits, particularly in reducing cholesterol levels and promoting heart health. Foxtail millet has been studied for its potential to improve digestive health due to its high fiber content, which aids in bowel regularity and the prevention of constipation.

However, despite these advancements in nutritional science, there remains a significant gap in fully understanding the role that these grains, alongside traditional rice varieties, can play in modern diets. This gap underscores the need to bridge traditional knowledge with contemporary research. While modern science provides valuable insights into the nutritional content and health benefits of these grains, traditional practices offer a holistic perspective that encompasses not just the physical but also the cultural and spiritual dimensions of food consumption.

For instance, in many traditional communities, food is seen as medicine, with specific grains and rice varieties being consumed not only for their nutritional value but also for their perceived healing properties. These practices are often rooted in a deep understanding of the local environment and the body's needs, shaped by centuries of empirical observation and cultural wisdom. Therefore, integrating this traditional knowledge with modern scientific research could lead to more comprehensive and culturally appropriate dietary recommendations that honor the past while addressing the health challenges of the present and future.

OBJECTIVES

1. To evaluate the nutritional content (proteins, dietary fiber, vitamins, and minerals) of traditional Kandyan rice varieties and selected grains.
2. To analyze the health benefits and therapeutic applications of these traditional grains, as supported by both traditional knowledge and contemporary scientific research.
3. To assess the impact of these grains on specific health parameters, including blood sugar levels, antioxidant capacity and dietary fiber content.

METHODOLOGY

The study utilizes a mixed-methods approach, combining qualitative data from the original Data set of Kandy cuisines collected through in-depth interviews with a comprehensive literature review to assess the nutritional and health implications of traditional rice varieties and grains.
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Qualitative Data Collection

The qualitative component involved semi-structured interviews with 17 key informants across three generations. These interviews explored the cultural significance, preparation methods, and perceived health benefits of the selected rice varieties and grains. Thematic analysis was used to identify patterns in the data related to nutritional and health aspects**.**

Literature Review

A comprehensive literature review was conducted using Google Scholar and PubMed, focusing on studies published between 2014 and 2024. The review primarily utilized the original dataset on Kandy traditional foods, examining research on the nutritional content, mineral composition, antioxidant levels, dietary fiber, and health benefits of the grains. This scholarly review provides a scientific foundation for the traditional practices discussed in the interviews.

Data Synthesis

The qualitative findings were synthesized with insights from the literature review to identify connections between traditional knowledge and modern scientific evidence. This integrated analysis allowed for a comprehensive evaluation of the role of these grains in contemporary diets and informed culturally relevant dietary recommendations.

RESULTS AND DISCCUSSION

Table 1: Traditional Kandyan Grain dishes and their properties

This table explores the nutritional and medicinal uses of various grains, including Finger Millet, Foxtail Millet, Proso Millet, Maize, and Dark Fine Grain Rice, drawing from both Ayurvedic and modern scientific research. It highlights their traditional preparation methods, cultural significance in the Kandyan era, and potential health benefits, ranging from managing diabetes and cholesterol to promoting digestive health. These grains are rich in nutrients and bioactive compounds, contributing to their therapeutic properties. The table underscores the importance of integrating traditional knowledge with modern research to better understand and utilize these grains for health and well-being

No	**Plant Name**	**Dishes in Kandyan Era and Method of Preparation**	**Ayurvedic Properties and Actions**	**Health and Medical uses**
1.	Scientific name - *Eleusine coracana* English name - Finger millet Sinhala name - *Kurakkan* Sanskrit name - *Ragi* 	*Kurakkan kiribath* Combine *Kurakkan* with water, coconut milk, and salt. Boil until the desired consistency is achieved.	*Rasa*; Sweet (*Madhura rasa*) taste *Guna*; light (*Laghu*) and dry (*Ruksha*) qualities. *Virya* ;heating potency (*Ushna virya*) *Karma;*Balance the *Kapha Doṣa* , aggravate the pitta and *Vata Doṣa* when consumed in excess. promotes positive mental states, enhancing sattva (balance and clarity) and rajas (activity), while dispelling tamas, which is linked to negativity and inertia (1)	• Exhibits antioxidant, antimicrobial, antihypocholesterolemic, antifungal, antibacterial, antidiabetic (type 2 diabetes), nephroprotective, wound healing, and anticataractogenesis properties. May help prevent constipation, high blood cholesterol, and intestinal cancer.(2) Excellent staple food substitute for celiac patients due to its gluten-free nature. Rich inmagnesium, which may alleviate asthma severity, decrease migraine frequency, lower heart disease risk, reduce body fat, improve insulin sensitivity, and lower blood pressure.(3) • Finger millet is a highly nutritious grain, rich in protein, dietary fiber, and essential minerals like calcium and iron. It is gluten-free, low in GI, and high in antioxidants, making it beneficial for managing blood sugar levels and

				promoting overall health. (1-16)
2.	Scientific name - *Setaria Italica* English name - Foxtail millet Sinhala name – *Thanahal* Sanskrit name – *Kangu*  Classical Categorization 1. *Bhavaprakasha Nighantu – Dhanya varga* 2. *Raja Nighantu - Shalyadi varga* 3. *Dhanvantari Nighantu – Suvarnadi varga* 4. *Kaiyadeva Nighantu - Dhanya varga* 5. *Shodala Nighantu- Trinadhanya varga*	*Thanahal bath* *Thana Hal* is processed into small granules and steamed in a cylindrical vessel until firm. Served with a complementary curry dish	*Rasa*;Sweet taste (*Madhura Rasa*) , Astringent (*Kashaya Rasa* Guna;Dry in nature (*Ruksha Guna*) heavy to digest (*Guru Guna*) *Virya;* Cold potency (*Sheeta Virya*) *Karma;* Decrease *Kapha Doṣa* Increases *Vata Doṣa* . Improves taste (*Ruchya*), Heals fracture (*Bhagna Sandhana)*, Nourishes (*Brumhana)*, Relieves burning sensation (*Dahagna*) (4)	• May aid in cancer prevention and exhibit hypoglycemic and hypolipidemic effects. Enhances appetite. Valuable source of crude fiber, aiding digestion, promoting bowel movements, and providing a laxative effect. Acts as a diuretic and supports gall bladder function. Rich in resistant starch and antioxidants, potentially reducing inflammation and offering anti-cancer and anti-aging benefits. Naturally gluten-free, enhancing digestive health. Possesses emollient properties that may benefit the gastrointestinal tract and skin. (5) • Good source of protein, carbohydrates, and dietary fiber. It is rich in minerals like calcium and iron. The grain aids digestion, promotes bowel regularity, and exhibits hypoglycemic and hypolipidemic effects, making it

				beneficial for managing blood sugar and cholesterol levels.(17-20)
3.	Scientific name - *Panicum miliaceum* English name - Proso Millet Sinhala name – *Meneri* Sanskrit name – *Chinaka* Classical Categorization • *Bhavaprakasha Nighantu – Dhanya varga* • *Kaiyadeva Nighantu - Dhanya varga* 	*Meneri Bath* Seeded *Meneri* is boiled for two hours with salt. Served with a complementary curry dish "*Meneri Kiribath*". Cooked *Meneri* rice is combined with coconut milk and salt	Guna; Dry in nature (*Rukṣa*) Heavy to digest (*Guru*) *Karma;*Pacifies *Kapha* Therapeutics – Fractures and Diseases of horses (6) *Rasa;*sweet ,Sour *Guna;* Hot,Heavy *Karma;Tri-Doṣa* akara Excess urination &defecation (11)	• Traditionally used to treat dysentery, dyspepsia, ulcers, and constipation. Employed in addressing coughs, throat infections, respiratory tract infections, and cardiovascular conditions like hypertension. May help manage hypercholesterolemia, breast cancer, diabetes, gallstones, hematuria, and inflammation. Rich in phytochemicals like phytic acid and phytate, potentially contributing to lower cholesterol and reduced cancer risk.(7) • Good source of protein, carbohydrates, and essential minerals like phosphorus and potassium. It also contains dietary fiber, promoting digestive health. It is recognized for its antioxidant and anti-inflammatory properties, as well as its potential role

				in managing cholesterol and blood sugar levels. (21-24)
4.	Scientific name - *Zea mays* English name- Maize Sinhala name – *Irigu* Sanskrit name – *Makkaa* 	"*Irigu Bath*" Boiled meat and vegetables are combined with smashed, soaked, and seeded corn. The mixture is cooked in a clay vessel over an open flame for 30 minutes. Served with a complementary curry dish.	*Karma;*Zea mays (corn) exhibits properties that balance *Kapha* and *Pitta Doṣa* according to Ayurvedic principles. It is traditionally used to address conditions such as general weakness, anorexia, hemorrhoids, and emaciation. Due to its cooling nature, it is considered a suitable food for summer. Corn is believed to nourish *Rasa Dhatu* (plasma), reduce water retention, and lower blood pressure. Additionally, it is employed to alleviate frequent urination and difficulties with urination, particularly in cases of prostate disorders	• Rich in B-complex vitamins that promote healthy skin, hair, heart function, brain health, and digestion. May alleviate rheumatic symptoms by improving joint mobility. Contains vitamins A, C, and K, along with beta-carotene and selenium, which support thyroid function and immunity. Supports liver function and bile production. May help maintain healthy blood pressure, regulate cholesterol, and prevent cardiovascular diseases. (9) • Good source of carbohydrates and dietary fiber, providing energy and promoting digestive health. It also contains B vitamins and minerals like phosphorus and magnesium. The presence of antioxidants like lutein and zeaxanthin may offer potential eye health benefits.

				(25-28)
5.	Scientific name- *Oryza sativa* English name -Dark fine ~~grain~~ rice Sinhala name - *Kalu Heenati* Dark fine ~~grain~~ rice 	*Diya bath* - Boiled *Heenati* rice is soaked overnight in a clay pot with a small amount of water. Coconut milk, chopped green chilies, red onions, and salt are added and mixed well.	This special traditional verity no Ayurveda Literature found	• Recommended for daily consumption, especially beneficial for lactating mothers. Traditionally used to boost sexual potency and physical strength. May help control diabetes, regulate bowel movements, and lower cholesterol. Used in treating hepatitis and snake bites (gruel form). High in fiber, aiding in digestion and preventing constipation.(10) • good source of carbohydrates, protein, and dietary fiber. It also contains essential minerals like iron and zinc, and various bioactive compounds, including anthocyanins, which contribute to its antioxidant properties.(29-31)

Table 2: Comparative Nutritional Analysis of Traditional Grains and Rice

This table compares the nutritional values of different millets and rice, highlighting key nutrients like protein, fat, carbohydrates, and dietary fiber. Each grain has a unique nutritional profile: Finger Millet is high in protein and fiber, Proso Millet offers protein and carbohydrates, and Foxtail Millet is rich in carbohydrates. The table also notes additional benefits, such as being gluten-free and having antioxidant properties.

Nutrient/Amount (per 100g)	Finger Millet	Proso Millet	Foxtail Millet	Maize	Dark Fine Rice (Kalu Heenati)	References
Protein	7.3 g	12.5 g	11.65 g	9.2 g	6.4 g	Singh, 2016; Singh & Kumar, 2016; Pasha et al., 2022; Rouf Shah et al., 2016; Ratnayake et al., 2023
Fat	-	3.5 g	3.48 g	-	-	Singh & Kumar, 2016; Pasha et al., 2022
Carbohydrates	-	56.1 g (starch)	75.33 g	73 g	71.9 g	Singh & Kumar, 2016; Pasha et al., 2022; Rouf Shah et al., 2016; Ratnayake et al., 2023
Dietary Fiber	19.1 g	8.5 g	2.21 g (crude fiber)	2.7 g	1.6 g	Singh, 2016; Dykes et al., 2018; Pasha et al., 2022; Ranum et al., 2014; Ratnayake et al., 2023
Calcium	344 mg	-	47 mg	-	-	Hassan et al., 2021; Pasha et al., 2022
Iron	3.9 mg	-	4.59 mg	-	1.8 mg	Hassan et al., 2021; Pasha et al., 2022; Gunawardana et al., 2024
Potassium	-	210 mg	-	-	-	Al-Huqail et

						al., 2022
Phosphorus	-	310 mg	-	-	-	Al-Huqail et al., 2022
Magnesium	0.11	0.12	0.13	-0.139	-	Thapliyal & Singh, 2015
Thiamine	0.42 mg	-	-	0.39 mg	-	Devi et al., 2014; USDA FoodData Central, 2023
Riboflavin	0.19 mg	-	-	-	-	Devi et al., 2014
Niacin	1.1 mg	-	-	1.7 mg	-	Devi et al., 2014; USDA FoodData Central, 2023
Zinc	-	-	-	-	3.5 mg	Gunawardana et al., 2024
Other	Gluten-free, low GI, high antioxidant content	Antioxidant and anti-inflammatory properties	Hypoglycemic and hypolipidemic effects	Lutein and zeaxanthin (potential eye health benefits)	-	Chethan & Malleshi, 2007; Chandrasekara & Shahidi, 2010; Verma et al., 2020; Nuss & Tanumihardjo, 2011

DISCUSSION

Traditional medical texts and practices in Sri Lanka offer a wealth of knowledge about the properties and uses of various grains, often aligning with modern scientific findings. Finger millet (*Eleusine coracana*), for instance, is traditionally used to balance *Kapha Doṣa* and promote positive mental states due to its sweet taste (*Madhura Rasa*)and light (*Laghu Guna*), dry (*Rūkṣa)* qualities (Srivastava et al., 2012). This traditional perspective is supported by modern nutritional analysis, which reveals that finger millet is a nutritional powerhouse. It boasts a high content of protein (7.3 grams per 100 grams) and dietary fiber (19.1 grams per 100 grams), contributing to satiety and digestive health (Singh, 2016).

Furthermore, finger millet is a rich source of essential minerals, including calcium (344 mg per 100 grams) and iron (3.9 mg per 100 grams), which are crucial for bone health and preventing anemia (Hassan et al., 2021). It also contains significant amounts of other minerals like

potassium, phosphorus, and magnesium (Thapliyal & Singh, 2015). The grain's impressive micronutrient profile includes vitamins like thiamine (0.42 mg per 100 grams), riboflavin (0.19 mg per 100 grams), and niacin (1.1 mg per 100 grams) (Devi et al., 2014). Notably, finger millet is gluten-free, making it suitable for individuals with celiac disease (Mbithi-Mwikya et al., 2000). Its low glycemic index (GI) and high antioxidant content contribute to its potential benefits in managing blood sugar levels and reducing the risk of chronic diseases (Chethan & Malleshi, 2007). This convergence of traditional wisdom and modern scientific evidence underscores the value of finger millet in promoting health and well-being.

Foxtail millet (*Setaria italica*) is described in traditional Sri Lankan medicine as sweet (*Madhura rasa*) and astringent (*kaṣāya Rasa*), with a dry (*Rūkṣa Guna)*and heavy nature (*Guru guna*), and is used to heal fractures, improve taste sensation, and relieve burning sensations (Rao, 2017). Its "cold potency"(*Śtha Vīrya*) and association with improved digestion in Ayurveda correlate with its high fiber content, recognized in modern nutritional analysis (Sharma & Niranjan, 2018). This traditional knowledge is further supported by the grain's remarkable nutritional profile. Foxtail millet serves as a valuable source of protein, providing 11.65 grams per 100 grams, and is relatively low in fat, containing 3.48 grams per 100 grams (Pasha et al., 2022). The grain's carbohydrate content is substantial, at 75.33 grams per 100 grams, and it offers 2.21 grams of crude fiber per 100 grams (Pasha et al., 2022).

Moreover, foxtail millet is rich in essential minerals, including calcium (47 mg per 100 grams) and iron (4.59 mg per 100 grams) (Pasha et al., 2022). It also contains significant amounts of potassium, sodium, magnesium, manganese, copper, and zinc (Pasha et al., 2022). The grain's high fiber content aids digestion and promotes bowel regularity, contributing to overall digestive health (Sharma & Niranjan, 2018). Additionally, foxtail millet exhibits hypoglycemic and hypolipidemic effects, making it beneficial for managing blood sugar and cholesterol levels (Verma et al., 2020). Its rich nutritional composition and potential health benefits underscore its importance in traditional diets and its potential for broader incorporation into contemporary dietary recommendations.

In traditional Sri Lankan medicine, Proso millet (*Panicum miliaceum*) is considered dry *(Rūkṣa)* and heavy (*Guru*), with the ability to pacify *Kapha Doṣa*. It has been traditionally used for treating dysentery (*Atīsāra*), dyspepsia (*Ajīrña*), and ulcers (Singh, 2016). This traditional knowledge aligns with modern nutritional analysis, which reveals Proso millet's noteworthy nutritional profile. Despite being less common in modern diets, it offers a good source of protein (around 12.5 grams per 100 grams) and is relatively low in fat (3.5 grams per 100 grams) (Singh & Kumar, 2016).

The carbohydrate content of Proso millet is primarily in the form of starch (56.1 grams per 100 grams), providing sustained energy release (Singh & Kumar, 2016). Additionally, it contributes essential minerals like phosphorus (310 mg per 100 grams) and potassium (210 mg per 100 grams), vital for various bodily functions (Al-Huqail et al., 2022). Proso millet also contains notable amounts of magnesium, iron, and zinc (Al-Huqail et al., 2022). The grain's dietary fiber content (8.5 grams per 100 grams) aids digestion and promotes gut health, supporting its traditional use in treating digestive ailments (Dykes et al., 2018).

Furthermore, Proso millet is recognized for its potential health benefits, including antioxidant and anti-inflammatory properties, as well as its role in managing cholesterol and blood sugar levels (Chandrasekara & Shahidi, 2010). These nutritional and health attributes highlight the value of Proso millet in traditional diets and its potential for broader inclusion in contemporary food practices.

In Sri Lankan traditional medicine, Maize (*Zea mays*) is believed to balance *Kapha* and *Pitta Doṣa*, addressing conditions like weakness (*Daurbalya*), anorexia (*Aruchi*), and hemorrhoids (*Arśas*). It is also used to support liver function and bile production (Rouf Shah et al., 2016). These traditional uses are complemented by modern nutritional analysis, which recognizes the nutritional value of maize. Maize is a good source of carbohydrates (73 grams per 100 grams), providing a readily available energy source (Rouf Shah et al., 2016). While moderate in protein content (9.2 grams per 100 grams), maize offers a decent amount of dietary fiber (2.7 grams per 100 grams), contributing to digestive health (Ranum et al., 2014).

Maize is also a source of essential micronutrients, including B vitamins like thiamine (0.39 mg per 100 grams) and niacin (1.7 mg per 100 grams), which play vital roles in energy metabolism and nervous system function (USDA Food Data Central, 2023). Additionally, maize contains minerals like phosphorus and magnesium, albeit in lower amounts compared to other grains (USDA FoodData Central, 2023). The presence of antioxidants like lutein and zeaxanthin in maize has been linked to potential eye health benefits (Nuss & Tanumihardjo, 2011). While maize may not be as nutrient-dense as some other grains, its overall nutritional profile and potential health benefits contribute to its value in diverse dietary contexts.

Dark fine grain rice (*Oryza sativa*), known as *Kalu Heenati* in Sinhala, holds a prominent place in traditional Sri Lankan cuisine and medicine. It is recommended for daily consumption, particularly for lactating mothers, and is traditionally used to boost sexual potency, physical strength, and manage diabetes, bowel movements, and cholesterol (Ratnayake et al., 2023). These traditional uses are supported by modern research, which highlights Kalu Heenati's unique nutritional profile and potential health benefits.

Kalu Heenati is a good source of carbohydrates (71.9 grams per 100 grams), providing sustained energy (Ratnayake et al., 2023). It also contains a moderate amount of protein (6.4 grams per 100 grams) and dietary fiber (1.6 grams per 100 grams), contributing to satiety and digestive health (Ratnayake et al., 2023). Moreover, *Kalu Heenati* is a source of essential minerals, including iron (1.8 mg per 100 grams) and zinc (3.5 mg per 100 grams), vital for various physiological functions (Gunawardana et al., 2024). It also contains various bioactive compounds, including anthocyanins, which contribute to its antioxidant properties and potential health benefits (Jayawardena et al., 2023). These nutritional attributes, coupled with its cultural significance and traditional uses, make Kalu Heenati a valuable component of Sri Lankan cuisine and a potential candidate for broader inclusion in diverse dietary contexts.

CONCLUSION

This research underscores the nutritional and cultural significance of traditional Sri Lankan rice varieties and grains, specifically Finger millet, Proso millet, Foxtail millet, Maize, and *Oryza sativa* (rice). These grains are rich in fiber, antioxidants, minerals, and essential nutrients, contributing to improved health and the management of chronic diseases. Their adaptability to local conditions highlights their importance for food security and cultural preservation in Sri Lanka. These grains also possess unique properties and traditional uses, such as balancing *doshas*, promoting digestion, and managing various ailments. The persistence of these grains in rural communities demonstrates the enduring link between traditional knowledge, food practices, and cultural identity. Promoting these grains in contemporary diets could address nutritional deficiencies while supporting sustainable agricultural practices. Revitalizing interest in these traditional grains is essential for both cultural preservation and achieving broader health and environmental sustainability goals.

RECOMMENDATIONS:

1. **Promote Traditional Grain Consumption:** Implement public health campaigns and educational programs highlighting the nutritional and cultural value of traditional grains to encourage their incorporation into modern diets.
2. **Support Sustainable Agriculture:** Advocate for policies and initiatives that incentivize the cultivation and preservation of indigenous grain varieties, supporting biodiversity and traditional farming practices.
3. **Integrate Traditional and Modern Knowledge:** Foster interdisciplinary research collaborations between traditional knowledge holders and nutritional scientists to develop culturally relevant and evidence-based dietary guidelines.
4. **Implement Community-Based Education:** Develop and deliver targeted educational programs in both rural and urban areas to raise awareness of the health benefits and cultural significance of traditional grains, empowering individuals to make informed dietary choices.

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A STUDY OF THE ASSOCIATION OF PRENATAL, NATAL AND POSTNATAL FACTORS ON *BALAKA PAKSHAGHATA*

G. I. P. Madusanka

W. A. S. S. Weerakoon

ABSTRACT.

Balaka Pakshaghatha can be defined under the *vata vyadhi* in Ayurveda. It is one of the main disorders that shows impairment of growth and development, delayed milestones, and weakness of limbs (*Gathi Vikurthi)* in children. It is a non-progressive posture, movement, and coordination disorder often associated with convulsion, and mental, visual, and hearing impairment. *BalakaPakshaghatha* can be correlated with the cerebral palsy condition. This study aimed to identify prenatal, natal, and postnatal factors associated with *Balaka Pakshaghatha.* After obtaining ethical clearance, this study was conducted as a non-interventional case-control design with 33 parental participants at the National Ayurveda Hospital, Borella. Data was collected through surveys of parents of diagnosed *Balaka Pakshaghatha children* aged 1-16. Logistic regression analysis was applied for data interpretation. Key findings indicated that 70% of mothers experiencing pregnancy complications had children diagnosed with *Balaka Pakshaghatha* . Significant factors included maternal health conditions, preterm birth, low birth weight, and birth asphyxia, all contributing to developmental delays observed in *Balaka Pakshaghatha* patients. Additional factors such as delivery patterns, postnatal infections, seizures, and further developmental delays were identified, aligning with Ayurvedic literature. Future research should expand upon these findings to inform public health strategies to prevent *Balaka Pakshaghatha* and enhance outcomes for affected children and families.

Keywords: *Balaka Pakshaghata*, Causative Factors, postnatal, seizures

INTRODUCTION

Abnormalities in any part of the nervous system are recognized as neurological disorders. Neurological disorders in children have become a major concern in the present population. These abnormalities may result in several deep-rooted problems, and their impacts on quality of life and productivity are considerable, not only for affected children but also for families and populations as a whole. According to the Ayurveda concepts, neurological disorders can be correlated with *Vata Vyadhi.*

Many neurological disorders in childhood are congenital and develop later in their lives, such as; Cerebral palsy, Attention Deficit Hyperactivity Disorder, Autism, Epilepsy and Seizures, Learning and Developmental disorders etc. Among them, Cerebral palsy has become more common in present than in past years. Cerebral palsy has become the leading neurological disorder in childhood. Data suggests that it occurs in approximately 2.5 per 1000 live births in high-income countries[1].

Pakshaghatha is a major *vata vyadhi* described in Ayurvedic authentic texts which is manifested as the inability to move a group of muscles on either side of the body [2]. If it is affected by a child it can be described as *Balaka Pakshagata* (BP). It is a condition that affects movement, posture and coordination, and it is caused by Shiromarmābhighāta, before, during or soon after birth. Because of this problem, most children have to face many motor activity dysfunctions and it becomes a common developmental disability problem.

Cerebral Palsy (CP) is also a condition, described in modern point of view due to damage of the brain before, during or soon after birth.

Etiopathogenisis and symptoms of *Balaka Pakshagata* are similar to Cerebral Palsy. Hence, *Balaka Pakshagata* can be considered as Cerebral Palsy to a certain extent[3].

It is a complex of neurological disorders at the level of the central nervous system which appear in infancy or early childhood. Such babies are called as “spastics” as it affects the body’s ability to control movement, muscle coordination, and maintain posture and balance. This condition is a result of permanent damage in the brain occurring before, during or shortly after birth.

Balaka Pakshagata also various according to the affected limbs. When one limb is affected, it is called *Ekangagata* (Monoplegia) and when both lower limbs are affected, it is known as *Adarangagata* (Diplegia). When one side (Left / Right) upper and lower limbs are affected, it is called *Ardangagata* (Hemiplegia) and If all four limbs are affected it is known as *Sarvangagata* (Quadriplegia).

Although this is a rising problem in the present era, there are no proper treatments to manage these conditions in the modern system of medicine. Therefore, most people have recognized the importance and come in search of our Ayurvedic treatment for such conditions. However sufficient studies have not been done to identify the prenatal, natal and postnatal factors for BP. Therefore, the main aim of the study was to identify the association of prenatal, natal, and postnatal factors in *Balaka Pakshagata.*

MATERIALS AND METHOD

Ethical Considerations

Ethical clearance for the survey study was obtained from the Ethics Review Committee at the Faculty of Indigenous Medicine, University of Colombo (ERC 23/230). Participants, specifically parents of children with *Balaka Pakshagata*, were thoroughly informed about the study's purpose, procedures, potential risks and benefits, confidentiality measures, and their rights. Informed written consent was secured from parents or guardians before participation, ensuring a clear understanding of the study. All data collected were treated confidentially, with identifiable information anonymized to uphold privacy standards. These measures were implemented to protect participants' rights and well-being, aligning with high ethical standards in research.

Study Method

The study utilized a non-interventional case-control design conducted at the Ayurveda Teaching Hospital in Borella. Prior administrative approvals were secured from hospital authorities to ensure compliance with institutional protocols and regulations before data collection commenced.

Study Population

The study focused on conducting a parental survey regarding children diagnosed with BP.

Study Design

Participants were selected through convenience sampling, focusing on parents of children with BP aged 1 to 16 years, recruited from pediatric clinics and the Ayurveda Teaching Hospital in Borella. The selection process was inclusive, without regard to race or religion. Data were gathered using a questionnaire.

Sample size: Thirty-three parents of children with BP were included in the study, with the sample size calculated using Lwanga's formula [4].

Inclusion Criteria: The study included parents of children aged 1-16 with BP who could read, write, and understand either English or Sinhala.

Exclusion Criteria

Primary caregivers, Legal gardens, and parents who cannot understand, write and read English or Sinhala were excluded.

Data collection method

The study involved interviews with parents of children with BP to explore etiological factors and assess health, alongside taking anthropometric measurements of the infants. The principal investigator ensured data confidentiality and privacy.

Data analysis method

The data analysis for that study employed logistic regression to examine various aspects, including the characterization of the study population, identification of risk factors, and exploration of the signs and symptoms in children with *Balaka Pakshaghatha* . Logistic regression analysis assessed the relationship between the variables of interest and determined their potential associations within the study population.

RESULT

Mothers' experiences during the pregnancy (n=33)

Nearly 70% of mothers who experienced complications during pregnancy had children with BP, compared to 30.30% of mothers without complications. (Figure 1)

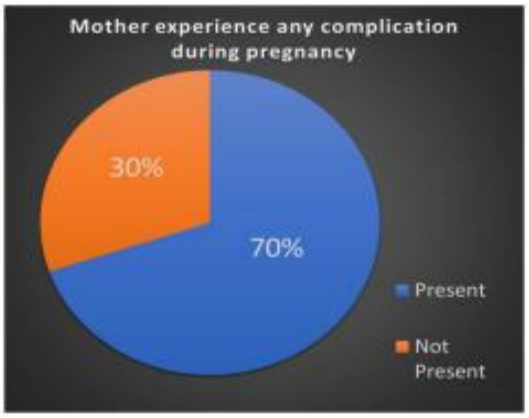

Figure 1:Distribution of associated problems of mother experiencing any complications during pregnancy of patient with BP(n=33)

Types of complications

Maternal health conditions were the most prevalent, accounting for 60.86% of observed complications in mothers with children having BP. Placental and uterine issues, as well as infection and immunological factors, were also notable contributors, each accounting for 13.04%. Foetal conditions and development and cervical factors had lower incidences at 4.34% and 8.69%, respectively. (Figure 2)

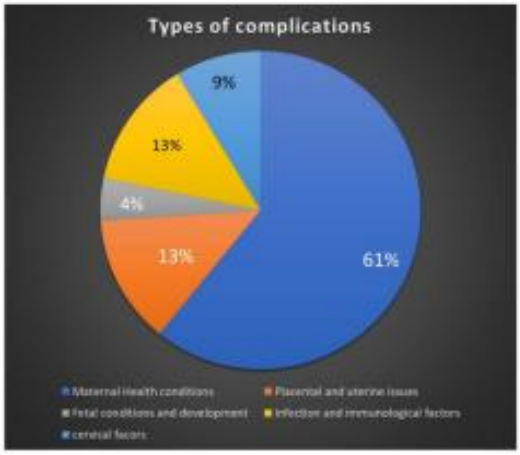

Figure 2: Types of complications observed in mothers with children having BP.(n=33)

Risk factors in pregnancy

Substantial percentage of cases (46%) where no specific risk factors were reported. Maternal age was reported as a significant risk factor in 18% of cases. A notable percentage of mothers reported high blood pressure (9%) and diabetes mellitus (15%) during pregnancy. (Figure 3)

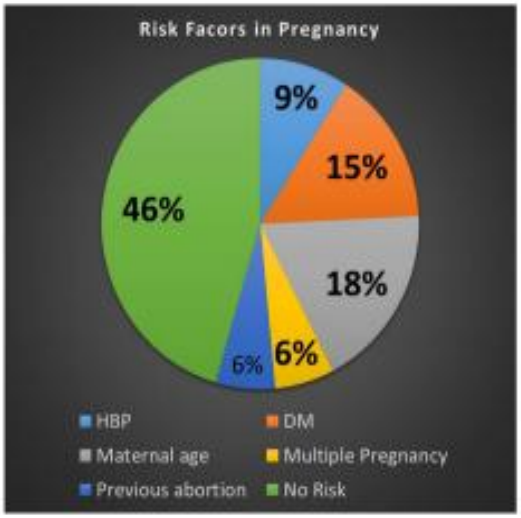

Figure 3: Risk factors in pregnancy reported by the mother of patients with BP(n=33)

Food intake pattern in pregnancy

A significant majority (72.72%) of mothers with BP were associated with a normal, healthy, homemade food pattern during pregnancy. However, 27.27% of cases were linked to a higher intake of junk food, artificial food, or instant food during pregnancy. (Figure 4)

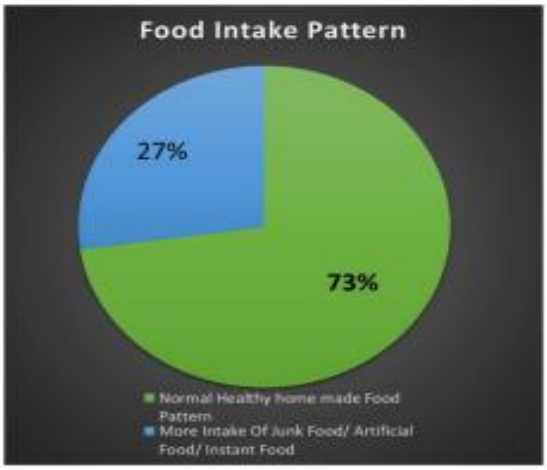

Figure 4:Food pattern of mother (Matru ahara) during pregnancy (n=33)

Age of conception

A smaller percentage 6% revealed instances of conception before the age of 18, suggesting a need for targeted interventions to address potential challenges associated with early maternal age. Significantly, 12% of cases reported conception after the age of 35, highlighting the potential risk and complication associated with advanced maternal age during conception (Figure 5).

Figure 5: Age of conception reported by the mother of patients of BP (n=33)

Mode of delivery

Among the reported delivery patterns, 51.51% were delivered via lower segment caesarean section (LSCS), while 39.39% were delivered via normal vaginal delivery (NVD). A smaller percentage, 6.06%, underwent forceps delivery, and 3.03% underwent vacuum-assisted delivery. This indicates that a higher proportion of children with BP were delivered via LSCS compared to NVD. (Figure 6)

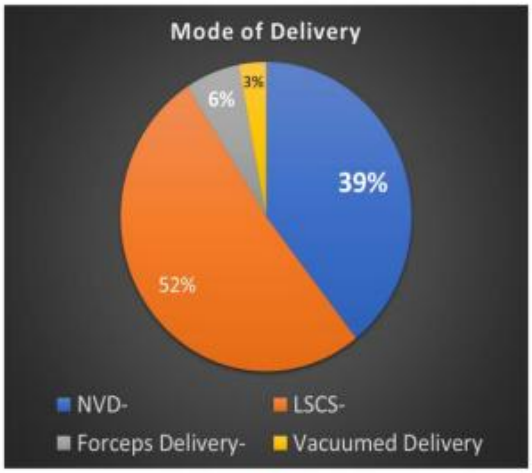

Figure 6: Mode of delivery recorded from mother of patient with BP (n=33)

Distribution of gestational age

Among the reported cases, 51.51% were born prematurely, while 48.48% were born at full term. This suggests preterm babies are at high risk because their organs are not fully developed (Figure 7).

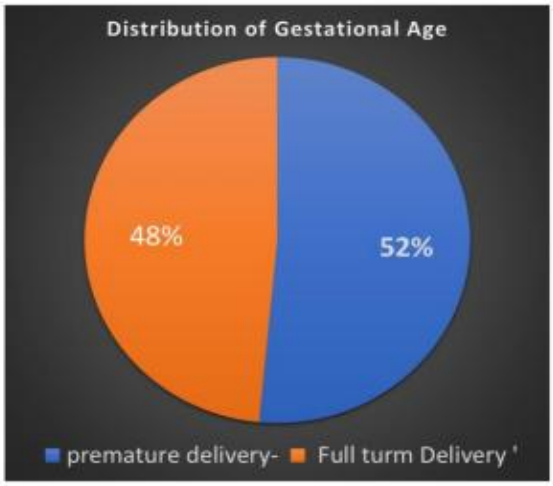

Figure 7 : Term wise birth recorded in patients of BP (n=33)

Distribution of birth weight

Among the reported cases, 51.51% were born with low birth weight, while 42.42% had normal birth weight, and 6.06% had high birth weight. This indicates that a higher proportion of children with BP were born with low birth weight compared to those with normal or high birth weight. (Figure 8)

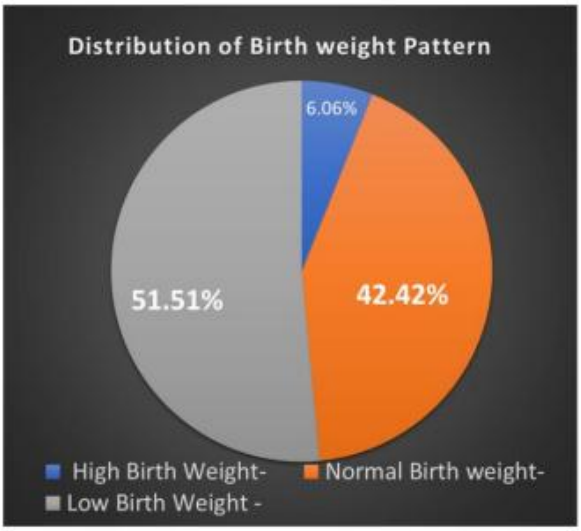

Figure 8 : Birth weight recorded from patients of BP (n=33)

Distribution of birth asphyxia

Among the reported cases, 45.45% had birth asphyxia, while 54.54% did not. This indicates that birth asphyxia is one of the important causes of BP and a main cause of brain damage (Figure 9).

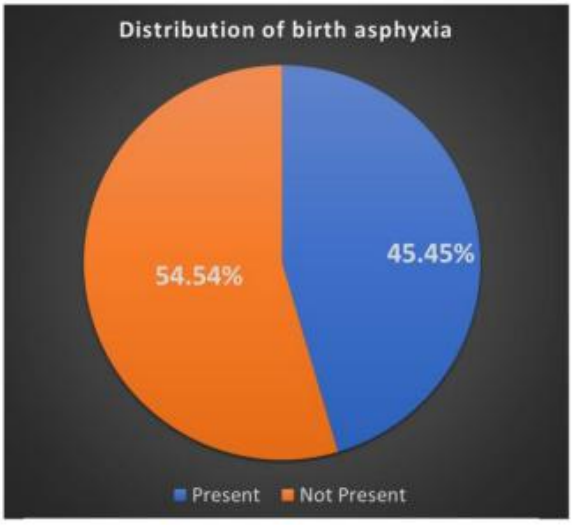

Figure 9 : Birth asphyxia (delayed cry) recorded from patients of BP (n=33)

Distribution of Complication in Umbilical Cord

Among the reported cases, 21.21% had complications related to the umbilical cord, while 78.78% did not. This indicates that a relatively small proportion of children with BP experienced umbilical cord complications (Figure 10).

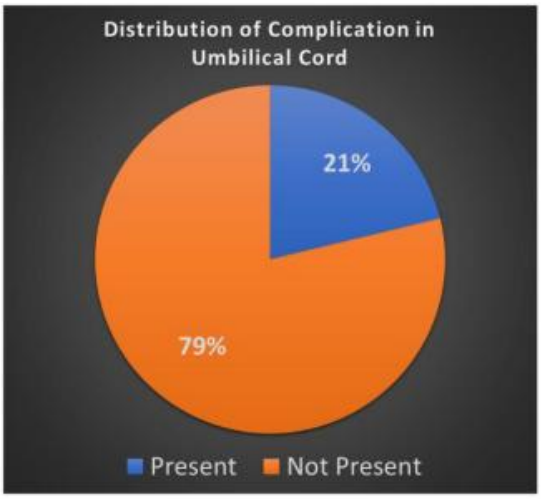

Figure 10 : Distribution of complications related to the umbilical cord

Distribution of admitted to special care at PBU or NICU

Among the reported cases, 51.51% were admitted to a special care unit, while 48.48% were not. This indicates that a significant proportion of children with BP received specialized care at the Neonatal Intensive Care Unit (NICU) or Premature Baby Unit (PBU). (Figure 11)

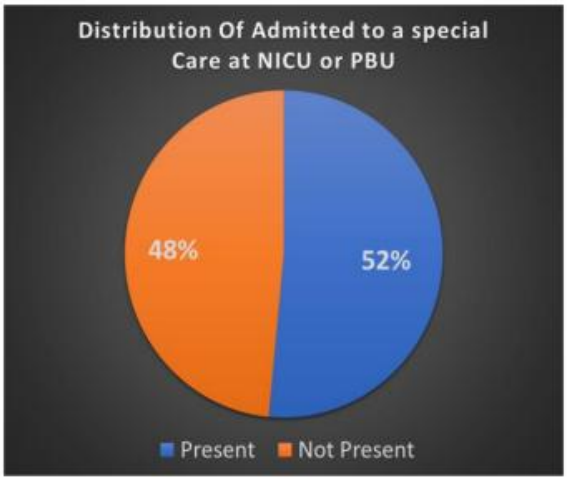

Figure 11: Factor-1 A special care at NICU or PBU required at the time of birth from patients of BP (n=33)

Distribution of experienced significant illness or infection of the child

Among the reported cases, 57.57% of babies experienced an infection or illness shortly after birth, while 42.42% did not. This indicates that a significant proportion of children with BP had postnatal health complications.(Figure 12)

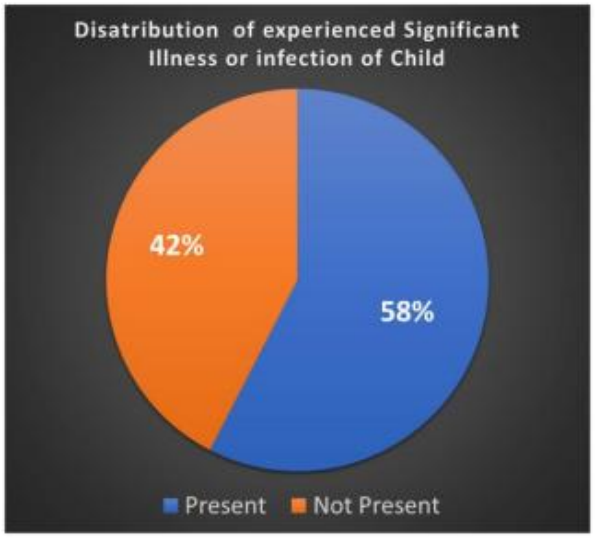

Figure 12: Distribution of experiencing any infection or illness shortly after birth of patient with BP (n=33)

Distribution of any seizure or convulsion

Among the reported cases, 42.42% of children experienced seizures or convulsions, while 57.57% did not. This indicates a significant proportion of children with BP had convulsions or seizures as the main postnatal neurological complication. (Figure 13)

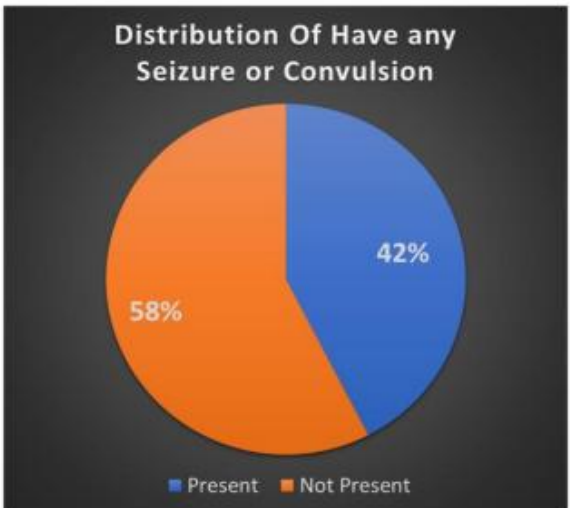

Figure 13 : History of Convulsion recorded from patients with BP (n=33)]

Distribution to any delays in reaching the development milestone

All reported cases (100%) experienced delays in reaching developmental milestones, while nonreported the absence of such delays. This indicates a strong correlation between delayed developmental milestones and BP; hence, parents can use this to identify their abnormalities at the beginning (Figure 14)

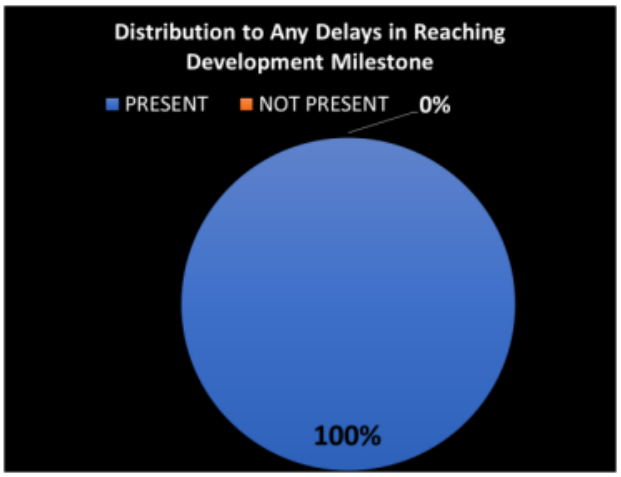

Figure 14 : Distribution to any delays in reaching developmental milestones of patient with BP (n=33)]

DISCUSSION

The word of Balaka Pakshagata can be taken as a multifactor disorders of Vāta, which appears in the first few years of a child. According to the findings of aetiologies 70% of mothers who experienced complications during pregnancy had children with BP . Maternal health conditions were the most prevalent, accounting for 60.86% of observed complications in mothers with children having BP. Placental and uterine issues, as well as infection and immunological factors, were also notable contributors, each accounting for 13.04%. Foetal conditions and development and cervical factors had lower incidences at 4.34% and 8.69%, respectively, Substantial percentage of cases (46%) where no specific risk factors were reported. Maternal age was reported as a significant risk factor in 18% of cases. A notable percentage of mothers reported high blood pressure (9%) and diabetes mellitus (15%) during pregnancy. A smaller percentage 6% revealed instances of conception before the age of 18, suggesting a need for targeted interventions to address potential challenges associated with early maternal age. Significantly 12% of cases reported conception after the age of 35, highlighting the potential risk and complication associated with advanced maternal age during conception. Among the reported delivery patterns, 51.51% were delivered via lower segment caesarean section (LSCS), while 39.39% were delivered via normal vaginal delivery (NVD). A smaller percentage, 6.06%, underwent forceps delivery, and 3.03% underwent vacuum-assisted delivery. This indicates that a higher proportion of children with BP were delivered via LSCS compared to NVD. Among the reported cases, 51.51% were born prematurely, while 48.48% were born at full term. This suggests preterm babies are at high risk because their organs are not fully developed. Among the reported cases, 51.51% were

born with low birth weight, while 42.42% had normal birth weight, and 6.06% had high birth weight. This indicates that a higher proportion of children with BP were born with low birth weight compared to those with normal or high birth weight. Among the reported cases, 45.45% had birth asphyxia, while 54.54% did not. This indicates birth asphyxia is one of the important causes of BP and a main cause of brain damage.

According to the Ayurveda concepts. aetiopathogenesis of BP / CP is categorized as pre-natal, natal and post-natal causes.), Problems which can be described under the Genital Organs (*Āshaya dosa*) , Disorders of Time (*Kāla dosa*) and Improper anti-natal care (*Garbhini Paricharya*.). Prolonged and weak uterine contraction (*Vilambita avi*), Stain without true labour pains (*Akāla pravāhana*), Head injuries during the labour (*Mūrdhābhighāta*.), Improper Resuscitation (*Delayed Prāna Pratyāgamana*) may lead to head injuries. They can be classified under Traumatic Conditions (*Sanghāta bala Pravrtha*) which occur during the perinatal period

Other health problems such as Infections (*Krimi*), *Nija* and *Āgantuja* disorders can be described as postnatal conditions. As a result of those causes, it may lead to damage to the Brain / *Shiromarmābhighāta* and lead to *Vāta Vurdhi.*

CONCLUSION

This study highlights several important prenatal, natal, and postnatal factors associated with *Balaka Pakshaghata* (BP), or cerebral palsy, emphasizing their significance for early diagnosis and intervention in child development. Prenatal factors include maternal complications and "high-risk" pregnancies due to underlying medical conditions. Natal factors reveal a higher incidence of BP in children born via lower segment cesarean section (LSCS), with low birth weight, preterm birth, and birth asphyxia identified as major risk factors contributing to brain injury. Postnatal factors include admissions to special care units, early infections, seizures, and developmental delays, all indicative of increased BP risk. Notably, these findings align with Ayurvedic literature, underscoring the value of traditional health perspectives.

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PSYCHOLOGICAL STUDY ON HELPING BEHAVIOR AND ITS IMPORTANCE FOR THE WELLBEING OF MANKIND

D. M. V. M. Dasanayaka

ABSTRACT

The philosophers namely Socrates, Plato and Aristotle have recognized the human nature and the necessity to guide and control human acts. The human acts due to primary instincts, namely flight, repulsion, curiosity, self-assertion and parenting, give emotions which become actions between individuals or among groups. [William mc Dougal 1908].There are important Theories in this regard namely Evolutionary, Socio-cultural, Learning, Decision Making and Attribution.

Prosocial behaviour is mainly for the wellbeing of their counterparts. Helping can be categorised as short term, spontaneous, long- term and planned as well as altruism and cooperation. The reasons for helping is vivid - mood, time factor, costvs rewards, sex, age, environment etc.

There are also norms followed by the society namely responsibility, reciprocity and social justice. Further it can be categorized as casual, substantial, emotional, and emergency.
Finally it can be summarized that Helping Behavior is actions and reactions due to inner circumstances and outer stimulus.

The lives of all living beings can be explained as a flow of actions and reactions. This is true to mankind too. This is called human behaviour. The behaviour is a reaction to inner circumstances as well as outer stimulus. Similarly there can be behaviours that benefit others, contributing to their wellbeing, which is recognized as helping behaviour.

Keywords : Altruism, Prosocial Behavior, Reciprocity, Social Norms,

INTRODUCTION

Psychology is mostly concerned on human behaviour. There are many important scientific researches done on different aspects coming under this field. One such sub division is Social Psychology which study interplay of individuals in the society. One aspect of this interplay is prosocial behaviour – helping behaviour which looks at the relationship between two groups or individuals namely the receiver and the helper. Social psychologists have carried out in depth studies for a long time and these studies have been carried out in many cultures in different periods of the human civilization. Folk tales, religious writings and ideas of philosophers also give evidence to the importance of prosocial behaviour for the existence and development of human civilization. The prosocial themes in these folk stories have served through generations to convey messages giving the importance of prosocial acts irrespective of culture, society etc. [Campbell, 1975[1]; Dawkins[2], 1976; Sober & Wilson[3], 1998]. Religious writings also give encouragement for good deeds and the rewards for them. There are different ideas expressed about human nature by philosophers of the past and present. It was far back as three, four centuries B.C. Socrates[4], Plato[5], Aristotle[6] have recognized the human nature and the need of remedies to guide and control the acts of humans. Even after 20th century, European philosophers namely Niccolo Machiavelli[7],[Machiavelli, N (2003), Th Prince (G. Bull, Trans.). London: penguin book and Thomas Hobbes[8]], [Thoma Hobbes (1589 – 1679)] addressed this issue. Reviewing the messages, ideas, concepts given in different sources give a good background for prosocial behavior.

Scientific Approach

But the scientific approach for prosocial behavior starts with the explanation given by William McDougal[9], in his social psychology text book (1908). According to him social behavior is lead by primary instincts namely flight, repulsion, curiosity, self - assertion and parenting. These instincts give rise to emotions which in turn become actions. He illustrates that the mothers care for her child is due to parenting instincts the most powerful instinct. Actually McDougal kept a further step. He wanted to identify the underlying process which led to human actions. He posed the question "why they act as they do?". This was a turning point in the field of prosocial behavior. Unfortunately he had to depend on the methods of investigation available at the time. The available methodology was limited to a critical conceptual analysis of the subject of interest. At that time direct observable type of evidence were not sought.

Only around 1960s the researches gradually recognized the relationship between prosocial behavior and how the individual and groups functioned. The murder of kitty Genovese incident was a turning point. This event led to social psychologists Bibb Latane and John Darley to explore the reasons as well as answers to number of questions emerged regarding the behavior of the neighbors, mainly not coming for her protection and the delay in informing the Police (Latane, B. & Darely, J.M 1970)[10] They were able to find some factors which lead to help or not, and to design a model depicting the decision making process of helping behavior. Thus it was the first step to empirical approach to prosocial behavior.Additionally it should be mentioned that not only social and behavioral sciences that study prosocial behavior. The interest in altruism and other prosocial actions have drawn the attention of Ethologists, Geneticists, Sociobiologists and other natural scientists like Neuroscientists who study brain functions related to prosocial behavior. Further social

scientists deal in sociology, anthropology economics, organizational behavior and political science have studied causes and consequences of interpersonal relationships.

Then it is necessary to understand precisely the particular terms used in this field of study. Prosocial behavior is a common word given to a vast number of activities done to benefit other people or society as a whole. The following statement is a good definition "Defined by society as generally beneficial to other people and to the ongoing political system".[Pilliavin, J.A., Dovidio, J. F, Gaertner, S.L.& Clark, R.D., 1981][11] Meaning of this definition is that there must be a benefactor as well as recipient (s) and it is a social judgement depending on the circumstances in which the behavior took place.

Types of Prosocial Behavior

To understand further about this theme it is necessary to analyze the three sub categories namely helping, altruism and cooperation. Helping is an action with an end result of giving some benefit or wellbeing to the receiver. According to analysis done by [McGuire (1994)][12] there are four kinds of helping namely casual, substantial, emotional and emergency. There are other types also namely planned and formal vs. spontaneous and informal, indirect vs direct. The concept altruism is also some kind of help.

In contrast to the two earlier concepts namely helping and altruism, there are instances when people get together and work together to achieve a common goal, the outcome of which will be rewarding to all. Thus it is a special kind of prosocial behavior named as cooperation. In helping and altruism the two parties concerned are not equal parties; one party in need of assistance and the other having the resources to give away, which may create a sense of power to the benefactor and indebtedness in the recipient. In contrast in cooperative activities with no power hierarchy and sharing of rewards commonly will result in togetherness and interpersonal relationships. Above three concepts can be categorized as short term, spontaneous help, as a response to immediate need.

Controversially there are planned and long term helping behavior namely volunteerism and community activism. Volunteerism means to give once time, efforts and resources to help others freely. On the other hand community activism is to engage in helping needs and development of organizations to solve these needs regularly. There is another category of planned and long term helping. This occurs in large organizations among paid employees. This is again two types. One type namely "Organizational Citizenship Behavior (OCB)" which indicates the helping of employees to a coworker. The second is called "Principled Organizational Dissent (POD)". It is about the employees concern about wrong or unethical activities of the organization they work for and "blow the whistle" on it.

The term helping behavior gives to one's mind about numerous kinds of helping acts. People sometimes help others without thinking of themselves. There are countless care giving acts by friends, family members and welfare organizations that provides aid to millions of people.When talking about helping behavior there are two key concepts namely altruism and prosocial behavior. Altruism could be described as voluntary act to help someone, for which no reward of any form is expected by the helper. Thus there can be a feeling of doing a good deed [Schroder, Penner, Dovidio & Piliavin, 1995][13] for the benefit of someone of which a person can think afterwards and get a satisfactory feeling. On the other hand the concept of prosocial behavior is very broad and differs from altruism (Batson, 1998)[14]. Main difference is that in some cases the helper may be motivated to help

with self interest. Additionally the helping can include casual help, substantial help, emotional help and emergency help. Besides it can be affected by such facts as liking, social obligation, self-interest, sympathy and these may lead to help those one knows than otherwise.

Theoretical bases underlying Prosocial Behaviour and Norms

The literature review reveals further that there are theoretical bases underlying prosocial behavior. These are 1) Evolutionary perspective, 2)Socio-cultural perspective, 3)Learning perspective 4)Decision making perspectives and 5)Attribution theory.

According to evolutionary perspective it is revealed that helping behavior is partly due to evolution. That means it comes through our genes and therefore a heredity. This is further proved by the observations made about animals by scientists. Charles Darwin's (1871) observations also highlights this fact. According to him the rabbits make noise with their hind feet to give signals to other rabbits about predators. Similarly baboons have the habit of responding to threats in order to protect the rest of the group. Similarly Dolphins, Nighthawks have similar habits. However, there are some criticisms about the facts discussed above and also counter arguments. One argument is social factors are more influential than biological factors in influencing prosocial behavior. For instance parents caring their young children can be categorized as basic prosocial behavior and comes through genetic evolution. But this may not be true in a situation of helping a stranger.

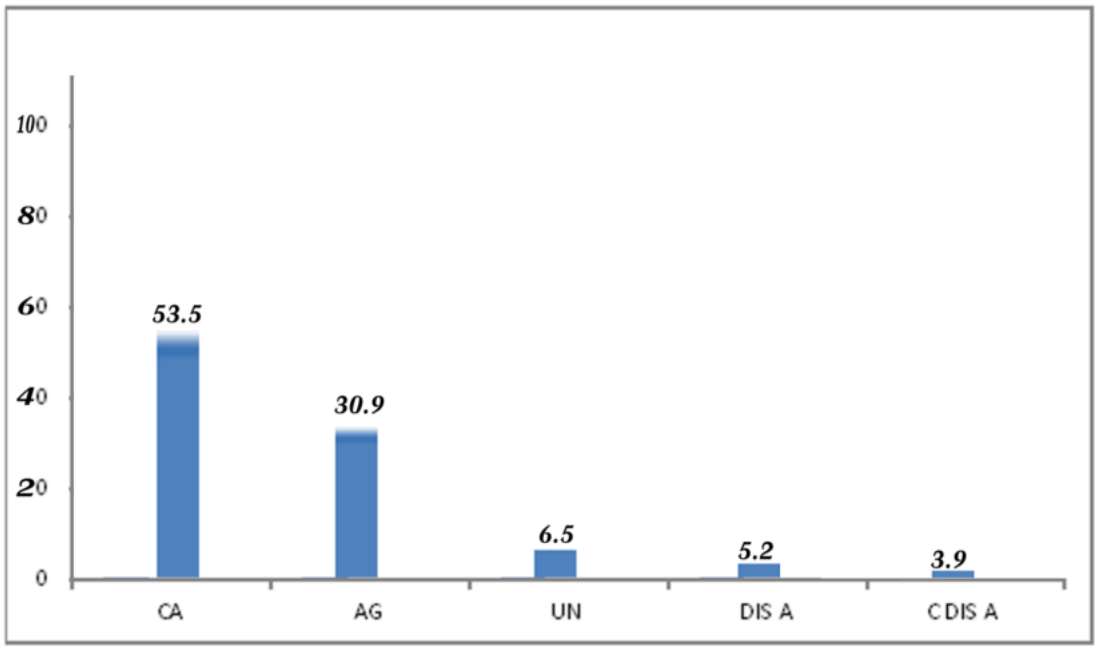
The next is the Socio cultural perspective. According to this approach social factors play a leading role in the helping behavior. What are those social factors? In the long history of human race, step by step they developed skills, beliefs, norms for the wellbeing of their members which became rules to be followed by the whole society as observed today. Accordingly there are three basic norms followed in the society. These are social responsibility, reciprocity and social justice.

The first norm social responsibility could be described as the help towards the people who depend on them. Number of examples can be given. Parents should care for their children. Teachers should help their students in learning activities. Similarly coaches, coworkers have their duties. Religions also emphasize this requirement. In some societies the requirement of helping the needy is a legal requirement.

The second norm that is reciprocity explains the need of helping those who help someone as an obligation. There are studies which show that there is more tendency to help someone from whom help has been already received (Regan, 1968). There are experiments which confirm this norm. Besides people tend to help those who are closer to them like friends, relatives assuming that they will in return help if any such need arises.

Graph No. i

Norm of Reciprocity*



* Data from the research done by the author.

The third is the norm of social Justice. This norm talks about fairness and equity in the distribution of resources. Equal contribution should gain equal rewards. If not there can be different behavior. The unbenefited person may feel distressed. Similarly the person who got more may tend to give to the person who got less. There can be a third person who understanding the situation may try to give to the person who got less. Donations of any kind can be explained as a solution to create fair and equity. Individuals come to know about these rules and norms through socialization and tend to behave accordingly in day to day life. Thus it can be seen that socio cultural basis also provides the foundation for prosocial behavior. But research shows that this varies from culture to culture depending on the degree of need.

The third perspective is the Learning perspective which discusses the significance of learning to help [Batson, 1998][14]. According to this theory there are two general principles mainly reinforcement and observation. Reinforcement principle discusses about the rewarding and punishment. Rewarding can be a praise and again the praise can vary. If the praise is about the personality of the helper, it is more effective than a praise about the deed. Observational learning means having watched prosocial models or helpful models and tend to behave accordingly.

Decision making perspective [Latane& Darley, 1970][10] is another theory regarding prosocial behavior. Although there can be instances of quick decision making and action, according to decision making perspective it has four steps. These can be summarized as follows:

- Perceiving a need
- Taking personal responsibility

- Weighing the costs and benefits
- Deciding how to help.

Details of above four steps will be discussed further. The most important of all steps is the first step. That is observing some situations and the decision to help. But there are instances when nothing could be seen but hearing voices of screaming or yelling. In general heart attacks, accidents are considered as situations which need immediate actions. But this is not always true. The situation may be misunderstood by the onlookers and not the unwillingness to help. A good example will be a possible cancer patient. Due to unawareness of the problem others fail to support the person emotionally or otherwise. The second step ie., decision to help depends on how one feels about responsibility. If one feels that is not his or her responsibility, then the tendency to help is nil or negligible. On the other hand if you are given a responsibility or feel, then the tendency to help will increase. There is another factor. It depends on the situation. For example, if it is something to deal with electrical shock, only those with formal training and knowledge will intervene, because he has talent and confidence to intervene.

The Third step will be that a person will weigh the costs and gains through a particular helping action. A person will weigh the cost against profits. Some actions of helping is comparatively easy while others is costly in aspects of time, energy, complexity and so forth. The cost depends on any inconvenience and possible threat. It depends on the deserving degree of the receiver. On the other hand one may later feel guilty that others may think bad of you, you may feel that you have failed to follow ethical standards. Such thoughts will influence your decision to help. Actually the decision to some extent is a cost-benefit analysis. But this is not always the case. There can be situations which demand instant action of help and emotions, values and courage lead the motivation to help.The final step is the decision to help or not and if yes what type of action to take. Due to emergency the decisions are taken under great stress, quickly and with personal danger. It has been highlighted by analysts that there are number of reasons for failing to render proper assistance due to afore mentioned facts.

The final theory is the Attribution Theory. According to this theory people tend to help those who actually deserve the help. If someone asks money to buy essential food item like milk then there is a tendency on the part of the helper to give some money or buy on behalf of the person in need and give. Otherwise there will be a negative reaction. Similarly the demander should be genuine, and deserves the help. It is more likely to help a man who fell on the ground due to a sickness rather than a drunken person. Thus potential helpers through available [Piliavin, Rodin & Piliavin, 1969][15] evidence to be seen regarding the cause of need, decide to help. There are number of studies done to find the reaction to controllable causes against uncontrollable causes and the finding is that it is more likely to help others if one feels that the cause of the problem is out of persons' control. Therefore if a person is responsible for any difficult or unpleasant situation receiving help is less likely especially from outsiders. It can be seen that our emotions are also affected and through that reactions occur. There are some studies done which shows that students sympathizes others with genuine academic problems than otherwise.

Similarly the demander should be genuine, and deserves the help. It is more likely to help a man who fell on the ground due to a sickness rather than a drunken person. Thus potential helpers through available [(Piliavin, Rodin & Piliavin, 1969)][15] evidence to be seen

regarding the cause of need, decide to help. In brief those who suffer due to a reason out of their control are being sympathized and necessary help is rendered and otherwise ignored. Up to this point it was discussed about theories regarding helping behavior with special attention on situations which attract helping behavior. Similarly it is also essential to look at who are these helpers, what made them to help while others do not come forward to help.

According to literature people tend to help if they are in a good mood. Mood can be described as a state of mind at a particular time. The reasons behind a good mood can be a very trivial thing; but it increases the willingness to help others. The specific reasons for this state of mind should be reviewed. According to the mood maintenance hypothesis it is assumed that we give help to lengthen our state of good feeling and this in return give positive thoughts. But there can be limitations. Good moods can be short [Isen, Clerk & Schwatz, 1976][16]. The effects of bad moods can work positively and negatively. In general when one is in a bad mood it makes us to think ourselves and our problems. So that it lessens helping others. Contradictory, to relieve our bad mood we may tend to assist others. According to the negative - state relief model people help to get relief of a bad mood.

There are two underlying reasons for helping others ie., personal distress and empathy. A clear distinction between these two reasons can be identified. Personal distress could be identified as a person's own emotional reactions to sorrowful condition of an outsider. The emotional reactions could be one's feelings of shock, horror, concern or helplessness. This happens when that person is preoccupied with their own emotional reactions. On the other hand empathy means through feelings of sympathy attend to someone in need; especially sharing imaginatively or indirectly the others' sufferings. Thus empathy occurs when the onlooker attend to the needs and feelings of victim. Personal distress means anxious and worry; empathy leads to sympathy and pity. According to research both personal distress and empathy will show physiological reactions such as heart rate patterns and facial expressions. It is presumed that people high in a need for approval do have a desire to get praise. Therefore with that intention they act more prosocially, but only when there are chances of noticing their good deeds. Although personality characteristics may lead to be a helpful person, it has been difficult to identify the most common features. Studies have been conducted about blood donors, rescuers of Jews in Nazi Europe and Samaritans. There can be numerous reasons behind these acts. In the case of Samaritans who intervened in dangerous crime episodes, it is found that these persons were comparatively tall, strong and trained to face such situations. It is also found that motivation is not through humanitarian concern, but based on their training and physical strength they had the competency and responsibility for such acts.

There exists a difference of sex in helping behavior. It depends on the type of assistance required [Meta-analysis in Eagly & Crowley, 1986]. Mostly it is men who help in rescuing a drowning person, saving a person being attacked. Women also engage in other types of helpful activities. More than half of the kidney donors are women. Accepted social roles of women has made women to engage in such activities as caring for children, looking after elderly, comforting a friend, taking an elderly to a clinic, provide advice about personal problems and so forth. Thus it is evident that men and women tend to engage in different types of helpful behavior.

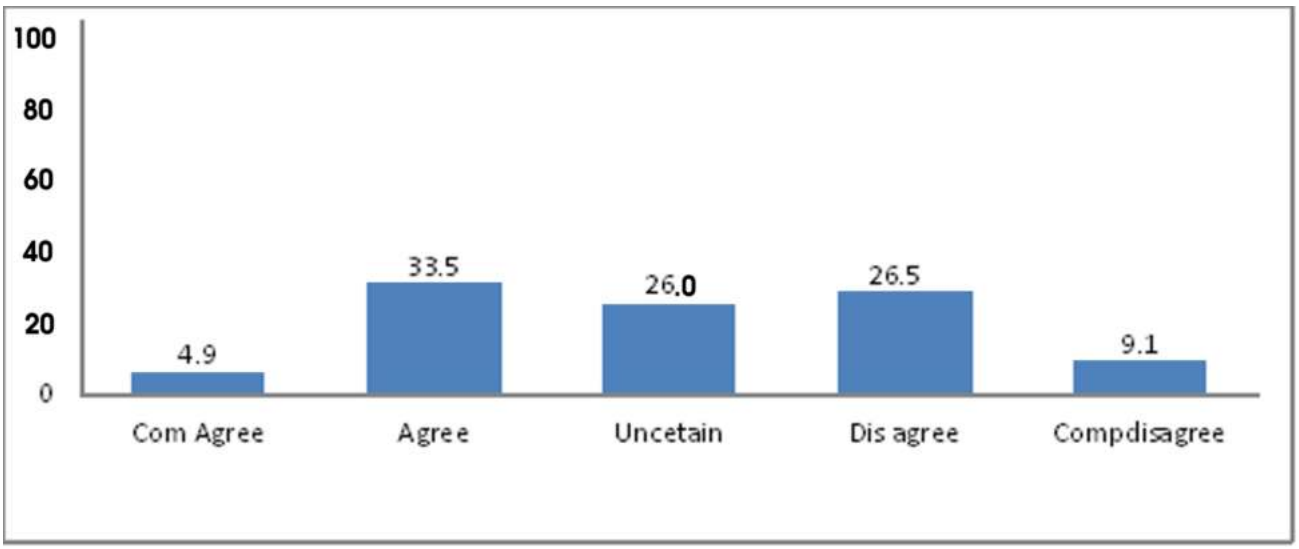
Forms of Helping Behavior

There are three different forms of helping namely Bystander intervention, Diffusion of responsibility and Evaluation apprehension.

Bystander intervention is the technical term for helping a stranger in distress. Psychological research into bystander intervention was initiated with the murder of Kitty Genovese [Latane & Darley, 1970][10]. According to this study several features of the situation namely presence of other people, nature of the physical environment and pressures of limited time has been identified [Latane & Darley, 1970][10]. How does the presence of number of persons prevent helping the victim? The reason is given as diffusion of responsibility. Each may think that someone else present will or already have done the necessary things as calling police, ambulance and so forth. Further since those present are not known to each other will be hesitation whether to talk or not. There is another factor named as 'evaluation apprehension'. It means one's concern about how others evaluate us. This evaluation can be positive or negative but not known. So a person will worry to help thinking that others will think badly. But there can be instances when watching will increase the tendency to help. Nature of physical environment will influence the helping behavior. Sunny day against a cold rainy day, a dark street vs well lighted one, small town or a big city are some examples. There are much research done on the subject. It has found that weather makes a difference. It is also found that where a person was brought up is immaterial. What matter is the environment where the need arose [Cunningham, 1979][18].

Graph No. ii*

Situational factors and help



* Data from research done by the author.

Time can also be a factor in a decision to help a person immediately. If you are hurrying to go somewhere and you are going for an important meeting or an appointment with a doctor then there is a time pressure which is a constraint to stop and help a needy person. So there will be a conflict in the mind whether to stop or not. [Darley & Batson, 1973]. Still you can arrange someone to help if possible although you are not in a position to help.

The expectations of working as a volunteer, cross-classified according to already volunteered or not (given as a percentage).

	Total	1	2	3	4	5	6
Total	385	4	2	5	5	41	43
Yes	142	5	1	7	11	40	37
No	243	3	3	3	.2	41	47

Answer categories

1- Carrier development
2- Spend leisure time
3- Get new acquaintances
4- To be a good citizen
5- Get special knowledge
6- other

Volunteerism means making a commitment to help specially to charitable causes. The main feature of volunteerism is these activities are planned, sustained and time consuming [Snyder & Omoto, 2001][19]. Also they work as groups and joined to some kind of volunteer organization. This has a past history i.e. 17th century when the first organization was formed. Motives for volunteering vary. It enables to express some personal values as sympathy towards those suffering. There is a chance to gain knowledge, skills and experience. There is a social component. Can gain social approval and social relationship can be strengthened. Thus there are numerous benefits to be gained through volunteerism. It is a combination of altruism and self interest. Not only helping others but seeking help has fluctuations; while some eagerly seek help there are others unwilling to receive or seek help. If one understands that help is given genuinely, we may tend to accept it. On the other hand receiving helps implies ones inability, incompetence and too dependent; it may be a threat to our self-esteem. Actually it is an exchange of resources. People like to ask for help if they think that it can be repaid. Otherwise there can be a power imbalance. According to the reactance theory people react negatively if they feel that there is a threat to freedom.

CONCLUSION

The conclusion can be summarized as follows. Biologically humans are predisposed to act prosocially. Helping ones kin to live increases the chances of survival of own relatives. Similarly helping an unrelated person will return help which may increase the chances of survival and reproducing. The result is the carrying of own genes through subsequent generations. Genes do not cause prosocial actions directly. It provides the humans the capacity and inclination to involve in such activities. It is nature and nurture. In other words it is genetics as well as environmental influence. Finally whether help or not is a result of the social facts in combination with situational circumstances prevailed at the time. Thus it can be concluded that Helping Behavior is actions and reactions due to inner circumstances and outer stimulus.

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KNOWLEDGE AND ATTITUDES TOWARDS PALLIATIVE CARE AMONG AYURVEDA MEDICAL STUDENTS: A SURVEY-BASD STUDY

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ABSTRACT

Palliative care profoundly enhances the quality of life for individuals with serious illnesses by addressing their physical, psychological, social, and spiritual needs. In Sri Lanka, Ayurveda practitioners often provide care to terminally ill patients; however, the integration of structured palliative care principles within Ayurveda remains underdeveloped. Despite its critical importance, the inclusion of palliative care in Ayurveda medical education is notably limited. This study was expected to provide valuable insights for academics, healthcare staff, and policymakers, enabling them to align their vision and strategies to advance this integration. A cross-sectional survey was conducted to assess the knowledge and attitudes of Ayurveda medical students at the Institute of Indigenous Medicine, University of Colombo, regarding palliative care. Ethical clearance was secured, and data collection was conducted using a pre-validated questionnaire. The study involved 145 participants, with the data meticulously analyzed using SPSS 25 software. The assessed areas in palliative care, including general principles, drug management, and ethical considerations, revealed varying levels of knowledge, with students scoring 56.73% (SD = 8.71%) in general principles, 32.40% (SD = 6.65%) in drug management, and 18.98% (SD = 6.53%) in ethical considerations. Attitudinal analysis indicated strong support for hospital-based palliative care teams (75.9%) and home-based care services (77.2%), highlighting the importance of incorporating these services into the healthcare system. These findings highlight the urgent need for curriculum reforms and practical training in palliative care within Ayurveda education to equip practitioners with the skills to deliver holistic, patient-centered care and improve patients' quality of life.

Keywords: Palliative Care, Ayurveda Education, Attitudes, Knowledge, Curriculum Development

INTRODUCTION

Palliative care is a specialized approach focused on alleviating suffering and enhancing the quality of life for individuals facing serious health challenges [1]. It addresses physical symptoms, emotional well-being, social connections, and spiritual needs within a holistic framework, prioritizing patient-centred care, dignity, and comfort [2].

The global demand for palliative care has surged, reflecting its critical role in managing end-of-life care. The World Health Organization reports that approximately 40 million people worldwide require palliative care annually, with the majority in low- and middle-income countries [3]. In the United Kingdom, over 63% of deaths require palliative care, underscoring its importance within healthcare systems. These trends highlight the urgent need to expand and integrate palliative care services globally, particularly in resource-limited settings [4].

Sri Lanka's rising life expectancy, as reported by the Department of Census and Statistics, presents new challenges in caring for an aging population with life-limiting illnesses [5]. Palliative care was introduced relatively recently in Sri Lanka, first included in the National Policy & Strategic Framework for Prevention and Control of Chronic Non-communicable Diseases (2010) [6]. The National Health Policy 2016–2025 emphasized the need for equitable access to quality palliative care, ensuring patients receive services that promote dignity in life and death [7]. The National Cancer Control Program (2019–2023) further streamlined palliative care activities, designating it as a vital component of cancer care [8, 9]. The Ministry of Health has emphasized the integration of palliative care into the national healthcare framework as a strategic priority. Given Ayurveda's pivotal role within the system, its practitioners are often at the forefront of managing patients in need of palliative care. This highlights the critical necessity for Ayurveda professionals to be well-versed and harmonized with the national palliative care initiatives [10].

Internationally, studies have highlighted gaps in undergraduate palliative care education, with fragmented curricula hindering the training of healthcare providers [11]. Experts recommend a multidisciplinary, integrated curriculum that encompasses both clinical knowledge and essential communication and ethical skills [12]. In Sri Lanka, a study at the University of Colombo revealed that only 22% of medical students were familiar with palliative care, with 76% acknowledging insufficient knowledge in managing terminal symptoms. Most students supported the inclusion of palliative care in the curriculum [13]. To address the knowledge gap, the Sri Lanka College of General Practitioners and the National Cancer Control Programme introduced a Postgraduate Diploma in Palliative Care in 2015 to enhance specialized training and improve the quality of care [14]. Studies have been conducted within the scope of palliative care in Sri Lanka across various healthcare systems, including among healthcare workers. However, no similar research has been carried out to assess the knowledge and attitudes towards palliative care among Ayurveda medical students.

The aim of this study is to assess the knowledge and attitudes towards palliative care among Ayurveda medical students, providing valuable insights for academics, healthcare staff, and policymakers. The findings are expected to help bridge existing knowledge gaps and foster a more informed and capable generation of Ayurveda healthcare providers in palliative care.

METHODOLOGY AND MATERIALS

A descriptive cross-sectional study was conducted to evaluate the knowledge and attitudes of Ayurveda medical students at the Institute of Indigenous Medicine, University of Colombo, towards palliative care. Using Cochran's formula with a 95% confidence level and a 5% margin of error, a minimum sample size of 118 participants was determined [15]. A total of 145 fourth-year students were surveyed via convenience sampling [16].

Data were collected from 1st January to 29th February 2023 using a standardized and pretested questionnaire. A combination of nominal and Likert scales was utilized. Knowledge was assessed through four questions each focusing on general principles, drug management, and ethical concerns in palliative care. Attitudes toward palliative care were evaluated using ten statements. The survey was administered both in person and online via Google Forms. Ethical clearance was obtained before data collection, and the analysis was conducted using SPSS software, employing both descriptive and inferential statistical methods.

RESULTS

Knowledge of Palliative Care: General Principles, Drug and Management, and Ethical concerns

Of the 145 students assessed, knowledge in three key areas of palliative care—general principles, drug and management aspects, and ethical concerns—was evaluated through four questions in each category. The responses for general principles of palliative care are detailed in Table I, drug and management aspects in Table II, and ethical concerns in Table III, showcasing the distribution of correct, incorrect, and uncertain answers across these areas. The distribution of knowledge scores, shown in Table IV, reveals that most respondents scored between 3 and 6 correct answers out of 12, with 20.7% scoring 3 correct answers. Additionally, 61.4% of participants scored 4 or fewer correct answers. The average knowledge performance across the three categories was 36.04% (SD=7.08%), as shown in Table V.

Attitudes on Palliative care

Ten statements were assessed to evaluate the attitudes of the participants, with the results categorized by the level of consonance with each statement, as illustrated in Table VI.

Table I: Distribution of Respondents' Responses on General Principles of Palliative Care

Statement	Do not know (%)	False (%)	True (%)
Palliative care is aimed at increasing the life expectancy of terminally ill patients.	6.2	56.6	37.2
Palliative care may improve survival.	10.3	18.6	71.0
Bereavement support to loved ones following the patient's death is part of palliative care.	40.0	11.0	49.0
Patients with COPD, Rheumatoid Arthritis need palliative care.	26.9	22.8	50.3

Table II: Distribution of Respondents' Responses on Drug and Management of Palliative Care

Statement	Do not know (%)	False (%)	True (%)
The preferred routes of administration of drugs in the most terminal stages of life are "oral" and "rectal."	24.8	37.2	37.9
Anti-convulsant may be added to step one of the WHO analgesic ladder.	35.2	38.6	26.2
Hyperkalaemia is one of the most common life-threatening metabolic emergencies in palliative patients.	40.0	19.3	40.7
Due to tolerance, morphine dosage for otherwise healthy adults is allowed up to a maximum of 600 mg per day.	60.7	25.5	13.8

Table III: Distribution of Respondents' Responses on Ethical Concerns of Palliative Care

Statement	Do not know (%)	False (%)	True (%)
Palliative care should be incorporated only after curative treatments have failed.	16.6	22.8	60.7
“Death rattle” (noisy respiratory secretions) is one of the most distressing symptoms near death.	44.1	11.7	44.1
“Palliative Sedation” hastens death but is not a serious issue in terminal stages.	30.3	27.6	42.1
Most terminally ill patients prefer only their next-of-kin/family to understand their prognosis.	39.3	13.8	46.9

Table IV: Knowledge Scores: Performance of Respondents Based on Number of Correct Answers

Score	Frequency	Valid Percentage (%)	Cumulative Percentage (%)
0	7	4.8	4.8
1	10	6.9	11.7
2	18	12.4	24.1
3	30	20.7	44.8
4	24	16.6	61.4
5	27	18.6	80.0
6	20	13.8	93.8
7	4	2.8	96.6
8	4	2.8	99.3
9	1	.7	100.0
Total	145	100.0	

Table V: Analysis of Overall Knowledge Performance in Three Key Areas

Category	Average Correct Responses (%) and standard deviation	Average Incorrect Responses (%)	Average Uncertainty (%)
General Principles of Palliative Care	56.73 (SD=8.71)	22.40	20.85
Drug and Management Aspects	32.40(SD=6.65)	27.40	40.20
Ethical and Treatment Aspects	18.98(SD=6.53)	48.45	32.58
Overall	36.04 (SD=7.08)	32.75	31.21

Table VI: Detailed Analysis of Attitudes towards Palliative Care

Statement	Agree (%)	Disagree (%)	Neutral (%)
The number of patients in need for palliative care is on the rise.	68.3	4.1	27.6
All dying patients should receive palliative care.	48.3	21.4	30.3
Patients should be informed about their prognosis, be it unfavourable or otherwise.	60.7	6.9	32.4
Family/loved ones should decide which details about the illness the patient should receive.	37.2	27.6	35.2
Steroids improve the quality of life of palliative patients.	41	13	46
The approach to terminal patients would be similar across specialists	16	67	17
More hospices should be established in Sri Lanka.	65.5	6.2	28.3
Home-based palliative care is much required by Sri Lankan society.	77.2	5.5	17.2
The burden of other non-communicable diseases is less frequent than cancer	18	75	7

DISCUSSION

Knowledge Gap

The survey among Ayurveda students reveals a significant knowledge gap in palliative care, with 61.4% of respondents scoring 4 or fewer correct answers out of 12, and only 6.21% scoring above 50%. The highest knowledge was in general principles (56.73%), while drug management (32.40%) and ethical treatment aspects (18.98%) showed much lower scores. The overall average score was 36.04%, highlighting the need for improved education in palliative care, especially in drug management and ethics.

Palliative care addresses the physical, emotional, spiritual, and social needs of patients, aligning with Ayurveda's holistic approach to promoting well-being [17]. Ayurveda plays a complementary role in alleviating pain, reducing anxiety, and enhancing quality of life for terminally ill patients [18]. The survey highlights significant educational gaps in palliative care knowledge among Ayurveda students, particularly in drug management and ethics. Addressing these gaps through enhanced training within the Ayurveda curriculum and fostering interdisciplinary collaboration between conventional healthcare providers and Ayurveda practitioners is essential to improving patient care in palliative settings [19,20].

Rising Demand of Palliative Care

The rising demand for palliative care is driven by the increasing burden of chronic conditions like cancer, cardiovascular diseases, and neurodegenerative disorders, compounded by an aging population [21].This survey revealed that 68.3% of medical students recognize the growing need, particularly as more elderly patients survive terminal illnesses [22,23,24].The demand for palliative care is projected to increase significantly, with an estimated 40% of people needing such services by 2040 this highlights the urgency for policies that prioritize access, training, and support [25]. Ayurveda's holistic principles—emphasizing physical, mental, and spiritual balance—align with palliative care goals, equipping students to address not only physical symptoms but also emotional and spiritual needs.

Universal Access to Palliative Care

Opinions on universal access to palliative care are divided, with 48.3% supporting it for all dying patients, while others emphasize resource allocation based on individual needs. Traditionally focused on chronic illnesses, palliative care is now recognized for its benefits in acute settings, addressing symptoms and providing holistic support [26, 27,28].Ayurveda's techniques, such as Rasayana, pain relief therapies, and stress management, enhance palliative care by addressing emotional and spiritual well-being, aligning with its goals for acute and chronic conditions [29].

Patient Autonomy and Family Involvement in Prognostic Disclosure

Informing patients about their prognosis is key to respecting autonomy and enabling informed decisions, with 60.7% supporting direct communication. However, 37.2% preferred family-mediated disclosure, reflecting Asian cultural norms that often prioritize emotional well-being [30,31,32,33]. Ayurveda emphasizes compassion, empathy, and integrity as essential qualities in doctors. In Sri Lanka, healthcare providers must balance patient autonomy with family involvement, aligning with ethical and legal responsibilities to respect cultural dynamics while upholding patients' rights [34].

Use of Anti-inflammatory Medications in Palliative Care

Corticosteroids are commonly used to manage symptoms like anorexia-cachexia, pain, and breathlessness, with 41% of respondents recognizing their role in improving quality of life [35,36,37] .However, their effectiveness in certain complications, such as neurological issues or soft tissue infiltrations, remains uncertain due to limited evidence and notable side effects[38] .For Ayurveda practitioners in palliative care, understanding appropriate dosages and the role of Western medications is essential to integrating holistic strategies and offering effective, multidimensional approaches to pain relief while minimizing dependency on anti-inflammatory drugs[39].

Holistic Approach of Palliative Care

The data highlights a strong distinction in how palliative care is perceived compared to other specialties. The overwhelming majority (67%) disagreed with the notion that there would be no difference in the approach of palliative specialists, underscoring the unique nature of palliative care. Palliative specialists are trained to adopt a comprehensive approach that not only addresses physical symptoms but also focuses on the psychological, emotional, and spiritual needs of patients, particularly those facing end-of-life issues. [40,41,42].This approach is patient-centered, focusing on improving quality of life, alleviating suffering, and supporting families. In contrast, other specialists may focus primarily on disease-specific treatments without this broader, holistic perspective [43]. The incorporation of Ayurveda's holistic methodologies into palliative care has the potential to complement modern medical practices, fostering a more compassionate and patient-centered approach.

Enhancing Palliative Care Infrastructure in Sri Lanka

Sri Lanka faces a critical need for enhanced palliative care infrastructure. A significant proportion of respondents (65.5%) supported the establishment of more hospices, highlighting the gap in specialized care for terminally ill patients. Additionally, 75.9% agreed that introducing Hospital Palliative Care Teams would improve care quality by integrating services and enhancing coordination [44]. Similarly, 77.2% endorsed the need for home-based palliative care, which offers patients familiar and supportive environments, improving quality of life. While the debate continues regarding the most suitable care model—hospice, hospital-based, or home care—the consensus is clear that expanding these services is essential to address the growing

demand for palliative care in Sri Lanka, given the country's limited resources and healthcare infrastructure[45,46].

LIMITATIONS

The COVID-19 pandemic restricted student accessibility, resulting in the inclusion of only fourth-year Ayurveda medical students. This limitation may influence the generalizability of the findings, and future research should consider a broader cohort encompassing students from different academic years for a more comprehensive analysis.

CONCLUSION

Palliative care is an emerging global necessity, and Sri Lanka has recognized its importance by initiating palliative care approaches within its healthcare framework. However, the integration of palliative care into Ayurveda remains an unmet opportunity. This study highlights significant gaps in knowledge and varying attitudes among Ayurveda medical students toward palliative care. While students demonstrated moderate awareness of general principles, deficiencies in understanding drug management and ethical considerations persist. The students' strong positive attitudes reflect their recognition of the vital role palliative care plays within Sri Lanka's healthcare system.

Integrating structured palliative care training into the Ayurveda curriculum, with a focus on hands-on experience and interdisciplinary collaboration, is essential. Ayurveda, with its holistic principles, possesses the capacity to effectively address the needs of palliative care patients. Such initiatives will empower future Ayurveda practitioners to provide holistic, patient-centered care, aligning with national healthcare priorities and meeting the growing demand for quality palliative services. These findings offer a valuable foundation for academics, policymakers, and healthcare stakeholders to advance palliative care education and practices in Sri Lanka, fostering a more competent and compassionate healthcare workforce.

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A COMPREHENSIVE LITERATURE REVIEW ON THE RELATIONSHIP BETWEEN THE NUTRIENTS AND QUALITY OF SEMINAL FLUID

D. A. L. Munasinghe

ABSTRACT

The life is supported by the food materials. Components of food materials (nutrients) are utilized in the body via biochemical and physiological processes, which is called nutrition, for making energy and chemical structures. Thus, nutrition is essential for a healthy life. Insufficient amounts of nutrients from the food to the body cause malnutrition. By assessing the nutritional status of someone, it is predicted whether the individual is malnourished or at risk to become. Due to the fact that nutrition affects body fluids and their function, it can directly or indirectly affect on seminal fluids as well. This literature study is aimed at finding whether the nutrition level of males affects semen or not. Thus, the objective of this literature survey is to find out the effect of nutrients on seminal fluid and its components. The information regarding the topic was gathered by searching the relevant databases during the period of May 2024 to October 2024. The major nutrients, such as carbohydrates, lipids, and protein, as well as minor nutrients (vitamins and minerals), are both required to form and function of the semen. Amino acids and proteins (albumin, carnitine) make components of the semen (seminal volume is increased) and indirectly help produce energy for the sperm. Fructose (a carbohydrate) acts as the energy substrate for sperm. Minerals such as zinc and selenium perform as antioxidants and help control the male hormone pattern (Zn). Vitamins such as A, C, and E reduce the free radical level and protect the sperms from oxidative stress to enhance their quality. However, overnutrition also affects indirectly and negatively the quality of semen. On finding of the study, it can be concluded on the study that balanced nutrition is essential for a functional and structural good quality semen product. Finally, the outcome of the review study could be considered as a platform for launching further studies on the topic and to consider the management of nutrition for quality semen.

Keywords: Nutrients, over nutrition, mal nutrition, semen

INTRODUCTION

Nutrition can be simply expressed as the biochemical and physiological process by which an organism uses food material for supporting life. Thus, nutrition provides organisms with nutrients, which can be metabolized for energy and chemical structures. Insufficient amounts of nutrients to the body cause malnutrition. Assessing nutritional status is important to identify the individuals who are already malnourished or at risk of becoming malnourished. The level of nutrients in the body can be assessed basically by two methods, naming direct methods and indirect methods. Direct methods deal with the individual directly and measure the objective criteria relevant to the nutritional assessment.
Direct methods include (Woods, 1982);

- Anthropometric method
- Biochemical method
- Clinical methods
- Dietary evaluation method

The anthropometric method considers body measurements such as weight per age, height per age, midarm circumference, head circumference, waist/hip ratio, or skin fold thickness to evaluate someone's nutritional level. However, the method is limited to the subject's current nutritional level. Anyhow, the midarm circumference/mid upper arm circumference has been recognized as a useful tool out of all for the fast assessment of nutritional level of someone (Suryanarayana *et al.,* 2014). Reproducibility of readings, precision and accuracy (due to standardized techniques), suitability for large sample sizes, less expensiveness, and the requirement of less training are the advantages of anthropometry. Lack of common statistical cutoff levels and inability to differentiate acute and chronic changes in nutrition of someone are the limitations of anthropometry. The biochemical method deals with the level of essential dietary constituents, such as measuring nutrients or their metabolites in body fluids such as blood and urine, which has a link with the individual's nutrient level (Wasantwisut *et al.*, 2002). Biochemical testing such as serum albumin assays (most widely used) (Fine, 2014), hemoglobin assays, stool examinations for the presence of intestinal parasites or their ova, vitamin assays such as checking vitamin A and D, and mineral assays (iodine) are considered under the biochemical method. Specificity, accuracy, reproducibility, and the ability to validate the data of other methods (e.g., the dietary method) are the advantages of the method. Time consumption, expensiveness (chemical and instrumental cost), requirement of trained personnel and facilities, as well as inability to apply on a large scale, can be highlighted as the imitation of the method. In the clinical methods, checking of characteristic signs and symptoms of nutrient deficiency is screened. E.g., iron deficiency includes pallor on the palm or conjunctiva (Open Learn Works, 2015). Performance ease, inexpensiveness, noninvasiveness, and the ability to use on a group of individuals at once are the advantages of the method. The inability to quantify the malnutrition and the requirement of well-trained personnel on the field are the disadvantages of clinical assessment. Dietary methods of assessment include looking at past or current intake of nutrients from food by individuals or a group for a period of time (usually 24 hours) to determine their nutritional status (Jee-Seon *et al.,* 2014). The method is used mostly to assess the nutritional status of under five children and pregnant women. The method is quick and easy (Reddy, 2014), nevertheless it depends on the subject's short-term memory.

Indirect methods include community health indices, which reflect someone's nutrition indirectly.

There are three categories available (Elamine, 2013):

- Vital health statistics (particularly infant mortality) and fertility index
- Ecological variables, including crop production
- Economic factors such as per capita income, population density & social habits

Under the limited foreign studies (Chard *et al.*, 1991), it had been found that there was a positive relationship between someone's nutrition level and sperm quality. Semen quality is decided basically by four seminal parameters. Sperm count, sperm motility, sperm morphology, and semen volume. If the parameters are within the normal reference range (which changes from time to time), the quality of semen is termed better. Thus, the current survey study was set up to screen the validity of the concept that nutrition of somebody decides the quality of semen. However, in most of the studies, the biochemical method (mostly serum albumin assay) and anthropometric measurement (mostly midarm circumference) have been considered as the markers of nutrition due to their wide usage, precision, ease, and reproducibility (Fine, 2014). Due to the fact that the midarm circumference depends on races, sex, ethnicity, and others, it was difficult to find a firm normal reference value for Asians. Anyway, in a review study of Tang *et al.* (2013) and a study of Suryanarayana *et al.* (2014), it has been mentioned that the figure of 22 cm or over for females and 23 cm or over for males is the normal reference value. However, the studies that had been carried out to check the association between the nutrition level of someone and seminal parameters are fewer in number.

METHODS AND MATERIALS

This literature review study was made basically on the articles pertaining to nutrition and male semen quality. Thus, to gather the information on the topic; online journals, articles, online magazines, relevant websites from databases (National Library of Medicine, Research Gate, Springer) and already published books (Library of the Faculty Indigenous Medicine, University of Colombo) and book chapters were searched and screened during the period of May 2024 to October 2024. All the gathered information was reviewed and analyzed to find the effect of male nutrition on semen quality.

RESULTS AND DISCUSSION

It has been found via nutritional analysis of semen that around 65% to 75% of the seminal plasma (Smith & Wallace, 2014) is made by a composition of amino acids, enzymes, proteins, and vitamin C. Thus, the nutrient level in the body has also played a major role in the quality of semen. A diet with a low level of fat and plenty of protein may enhance the sperm count, thus the quality of semen (Smith & Wallace, 2014). The semen volume was also increased by the protein. This could be due to the occurrence of numbers of proteins in the semen fluid, such as enzymes and structural proteins, which assist in expanding the volume. The majority of the fluid in the semen is secreted by the seminal vesical. Thus, the gland may absorb the serum protein to synthesize the component of the seminal fluid. Nutrition can indirectly affect the reproductive system via the endocrine system, which depends on nutrients essentially. Another way is obesity. Obesity is mainly due to overconsumption of macronutrients such as lipids and carbohydrates. It has been found in the studies that high-grade obesity indirectly causes poor semen (Palmar *et al.,* 2012). Carnitine, a dietary protein that acts as an antioxidant and free fatty acid transporter to the

mitochondrion of the spermatozoa (for ATP synthesis via the citric acid cycle and electron transport system), is important in the synthesis of quality enough semen (Gray, 2012). Fructose, a monosaccharide found in semen, acts as the main energy source of sperm. Micronutrients such as zinc (Zn) are essential to the development of reproductive organs themselves (Nuble, 2005). Further, zinc serves in the regulation of male hormones and has a role in prostate functions and sperm production as well. Thyroxin, an iodine-containing hormone secreted by the thyroid gland, is required to regulate the growth and body weight of a human being. Since the onset of puberty depends on a certain threshold of body weight and deposited fat, iodine controls sexual maturity indirectly (Nuble, 2005). Selenium (Se), which is abundant in brown rice, shrimp, chicken, pork, and salmon, and halibut oil, activates an enzyme called selenoprotein V (Mclaughlin, 2013) that is found exclusively in the testes. Thus, Se contributes to the development of healthy sperm cells. Another micronutrient, vitamins, mostly preserve the sperm via antioxidant properties pertaining to them. Vitamins A, C, and E have a prominent antioxidant ability against reactive oxygen species available in the semen. The positive relationship with antioxidant vitamins and semen quality has been proved by animal studies as well (Elmussareh *et al.,* 2015). A study (n = 121) that was carried out to find the relationship between the sperm count parameter and the seminal level of transferrin, albumin, and beta 2-macroglobulin found out that sperm count was positively relevant with the mentioned components (Chard *et al.*, 1991). The nutrients, especially the fructose and certain antioxidant vitamins, are the major and important sources for the survival of spermatozoa. As it was mentioned previously, serum albumin concentration and midarm circumference are considered nutritional markers. The scientists, Gorstein and peers in 1998, exposed that the nutritional status of an individual could be assessed with single or combined anthropometric measures (Gorstein & Akre, 1998). A United States study (N = 72), which was set up to indicate the effect of dietary fat intake on plasma sex hormone level, was able to disclose that the intake of fat, which could cause obesity, had a negative correlation with plasma testosterone and follicular stimulating hormone (FSH) (Bishop *et al.,* 1998). Another rare study (n = 916), which was carried out to find the relationship between the seminal level of albumin and semen parameters, enclosed that there was a positive relationship between seminal albumin and sperm count and morphology. Anyway, an opposite relationship was seen with the seminal volume. Further, it had been cleared from the study that most of the seminal albumin had derived from the accessory glands in addition to the contribution from plasma (Elzanaty *et al.*, 2007). In a Netherland study (with a number of 161 subfertile men), the effect of two dietary patterns—health conscious (high fruits, vegetables, fish, grains) and traditional Dutch (high meat, grains, potatoes, and low sweets)—on the seminal count was found to be positively correlated with the sperm count (Vujkovic *et al.,* 2007). In a Mexican study (2008), which was done with animal models, it was disclosed that high blood fluoride levels badly affected the sperm quality of rats, and this was due to high oxidative stress created by fluoride (Fluoridealert.org, 2014). A Swiss scientist, Stephen Daniells (2010), found out that long-term consumption of a soy-rich diet could cause a decrease in the sperm count (Jorge *et al.*, 2008). A study (n = 916), which was carried out with the mentioned objective, found that there was a positive relationship between the seminal albumin and sperm count as well as morphology. However, an opposite relationship had also been observed in the same study between the semen albumin and seminal volume (Elzanaty *et al.*, 2007). Thus, a high concentration of semen albumin has decreased the volume of semen. When the concentration of seminal protein becomes high, semen can be converted to a clot rather than a liquid. The measuring of the precise volume

of a clot is somewhat technically difficult. Perhaps in the study of Elazanty *et al.,* the false positive measurement might be possible.

CONCLUSION

In place of 65% to 75% of the seminal plasma (Smith & Wallace, 2014), it is made by a composition of amino acids, enzymes, proteins, and vitamin C. Thus, the nutrient level in the body plays a major role in maintaining the basic seminal parameters such as semen volume, count, motility, and morphology, hence the semen quality. The semen volume is increased by the protein. This could be due to the occurrence of numbers of proteins in the seminal fluid, such as enzymes and structural proteins, which assist in expanding the volume. Nutrients such as vitamins (A, C, and E) and minerals (Zn, Se) act as antioxidants, save the sperm from oxidative stress, and improve the motility and morphology of them. Carnitine improves the energy of spermatozoa to make them function properly. Zinc helps regulate male hormones and sperm production as well. Thyroxin, an iodine-containing hormone secreted by the thyroid gland, is required to regulate the growth and body weight of a human being. Since the onset of puberty depends on a certain threshold of body weight and deposited fat, iodine controls sexual maturity. Fructose, found in semen, acts as the main energy source of sperm. Dependent on these facts, it is obvious that the nutrition of somebody has a great link with semen quality. Anyway, overnutrition has also a negative impact on semen and its quality indirectly. High-grade obesity, which comes as a sequence of overnutrition, contributes to poor semen via affecting male hormone profiles.

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A CRITICAL REVIEW OF THE HEALTH AND NUTRITIONAL EFFECTS OF MILK AND MILK PRODUCTS ON HUMAN PHYSIOLOGY AND DISEASE PREVENTION

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ABSTRACT

Milk and dairy products are integral to the human diet, providing essential macronutrients and micronutrients that have long been celebrated in western nutritional science and traditional Ayurveda medicine for their role in supporting human health. In Ayurveda, milk is considered a complete and *Satvika* (pure) food, valued for its nourishing, grounding, and balancing qualities. The present study aimed to explore and critically analyze the health and nutritional effects of milk and dairy products from the Randomized Controlled Trials, clarify the effects and consider implications for dietary guidelines. Extensive research was carried out utilizing the PubMed database as the primary source of literature. The search strategy encompassed relevant keywords such as "health effects of milk and milk products on humans," "milk," "milk products," "dairy products," and *"Ksheera"* among others. After the meticulous search procedure, a total of 423 articles were retrieved from year 2000 to 2023. Through a rigorous selection process, only ten original research papers written in the English language were deemed suitable for inclusion. These selected papers exclusively pertained to Randomized Controlled Trials that involved cross-over study designs, and/or Clinical Trials. The review highlights the multifaceted health effects of milk and milk products, synthesizing findings from randomized controlled trials. Positive impacts on cardiovascular health, gastrointestinal function, musculoskeletal integrity, mental health, and immune response were noted, though the evidence remains mixed. Low-fat dairy products showed promise in improving blood pressure and lipid profiles, while probiotics in fermented milk supported gut microbiome health and reduced depression symptoms. Anti-inflammatory properties benefited post-exercise recovery and bone turnover, especially in women. Contrarily, no significant respiratory risks were linked to milk consumption. These results underscore milk's potential as both a nutritional staple and a functional food, emphasizing moderation and personalized dietary choices. Milk and dairy products provide critical nutrients and exhibit diverse health benefits. However, conflicting findings call for further research to clarify their role in human health. Integrating Ayurvedic perspectives with modern science offers a holistic approach to maximizing milk's therapeutic potential.

Keywords: Milk, *Ksheera,* Ayurveda, Nutrition

INTRODUCTION

Milk and dairy products constitute a crucial food group that contributes significantly to human health by supplying essential nutrients within the daily diet. These products are abundant in macronutrients, including lactose as the primary carbohydrate, as well as proteins and fats, alongside micronutrients like vitamin D, vitamin B12, B1, and vital minerals such as Calcium.[1] The impact of milk and dairy on health spans various bodily systems, encompassing both beneficial and adverse effects, including allergies and intolerances, primarily linked to lactose and associations with metabolic disorders. In response to these considerations, there is a growing trend towards plant-based dairy alternatives to mitigate potential adverse reactions.[2] With a history of consumption spanning centuries, milk and dairy have been regarded as cornerstones of human sustenance, delivering not only vital nutrients like Calcium and vitamin D but also high-quality proteins. Research has deeply explored their potential influence on diverse aspects of health, including cardiovascular and bone health, as well as overall well-being. The debate around the health implications of milk consumption has been robust, with investigations delving into their effects on factors like lipid profiles and blood pressure regulation.[3] As our comprehension of the intricate interplay between diet, lifestyle, and health advances, the imperative to critically evaluate scientific evidence about milk and dairy consumption grows stronger. In light of this, this review aims to provide an encompassing overview of the current state of research concerning the health consequences of milk and dairy products, shedding light on their potential advantages and contemplating their implications for public health recommendations highlighting both Ayurvedic and scientific viewpoints. Therefore, present study focused on providing a comprehensive and critical understanding of the diverse health effects associated with the consumption of milk and milk products by humans across various physiological systems, including cardiovascular, gastrointestinal, musculoskeletal, and respiratory health.

Ayurveda classifies milk into *Ashta Ksheera* and commonly used milk is cow's milk which has *Madhura Rasa* (sweet in taste), *Snigdha Guna* (oily in quality), and *Sheeta Virya* (cold in potency), making it particularly beneficial for balancing *Vata* and *Pitta Dosha.* Milk or *Ksheera* is considered as a health-promoting substance that should be consumed in specific ways for optimal benefits, such as being warm, unprocessed, and combined with spices like turmeric or ginger to enhance digestibility and mitigate potential negative effects. Ayurvedic texts further underscore the use of different types of milk, such as cow's, goats, or buffalo milk, each with unique effects on the body and mind. Cow's milk is particularly revered, believed to enhance *Ojas* (vital energy) and strengthen immunity when consumed appropriately. The review also synthesizes current research findings with Ayurvedic principles to offer a holistic view of milk's health benefits, exploring how Ayurvedic practices, like the addition of specific herbs or dietary adjustments based on individual constitution *(Prakriti),* may reduce the risk of intolerance and enhance therapeutic qualities of milk. This integrated perspective highlights the need for individualized recommendations that align modern nutritional science with personalized and preventive approach. Future research should consider holistic framework of Ayurveda to guide dietary recommendations and deepen the understanding of milk's complex role in human health.[4]

MATERIALS AND METHODS

The current investigation was conducted in the form of a comprehensive critical review. Extensive research was carried out utilizing the PubMed database as the primary source of literature. To maintain a stringent focus on empirical evidence, certain types of publications were deliberately excluded, including reviews, books, documents, systematic reviews, and meta-analyses. The search strategy encompassed relevant keywords such as "health effects of milk and milk products on humans," "milk," "milk products," "dairy products," and “Ksheera” among others. After the meticulous search procedure, a total of 423 articles were retrieved. Through a vigorous selection process, only ten original research papers written in the English language were deemed suitable for inclusion. These selected papers exclusively pertained to Randomized Controlled Trials (RCTs) that involved cross-over study designs, and/or Clinical Trials (CTs). Furthermore, the timeframe for inclusion spanned from the years 2000 to 2023, ensuring a contemporary and pertinent scope for the investigation.

RESULTS AND DISCUSSION

Out of 10 selected articles different systems and body tissues (such as the cardiovascular system, respiratory system, gastrointestinal system (GIT) and musculoskeletal system) were targeted and some effects of health were found in combination of psychological and physiological metabolic alterations. One study found the effect of the body on systemic inflammation. Therefore, the findings were summarized and discussed under the following subtopics.

1. Health effects on cardiovascular system and lipid profiles
2. Health effects on GIT, gut microbiome and effects on mental health
3. Health effects on musculoskeletal system, inflammation and physical activities
4. Health effects on respiratory system and allergies
5. Health effects on Immune System in communicable diseases

Although the inflammatory process in the body affects all the systems, here the inflammation was predominantly discussed with the musculoskeletal functions.

1. Health effects on cardiovascular system and lipid profile

Milk and dairy products impact heart health and lipid levels, providing essential nutrients like calcium and vitamin D. While high milk fat consumption may increase cardiovascular risk, low-fat options could lower cholesterol. Whole-fat dairy might raise saturated fat intake, affecting lipid profiles. Genetics and diet influence how dairy affects heart health. Diets rich in low-fat dairy may lower blood pressure via improved vascular function, though mechanisms for central blood pressure effects remain unclear.

Study No. 01

Participants in the study demonstrated high compliance with dairy product consumption, with both low-fat and full-fat groups consuming over 97% of provided dairy foods. Compliance was validated through dairy-fat biomarker concentrations. Changes in dietary intake were observed: increased saturated fats and calcium intake in full-fat dairy group, increased total sugars in low-fat dairy group, and altered macronutrient composition due to differences in dairy product fat content. No differential diet intervention effect on total cholesterol (per-

protocol, model 2, P = 0.328), triglycerides (P = 0.446), LDL cholesterol (P = 0.975), HDL cholesterol (P = 0.788), or free fatty acids (P = 0.825) in fasting serum, or the LDL-Rf (P = 0.118). Body weight, waist circumference, and fat mass were influenced by dairy consumption, particularly with greater increases observed in the full-fat dairy group compared to the limited and low-fat dairy groups (intermediate effect in participants consuming low-fat dairy foods).

Limitations of the study:

- focused on individuals with Metabolic Syndrome (MetS), mainly older and White, affecting generalizability.
- Providing all dairy foods-controlled compliance but might not reflect real-world choices.
- The study duration might have impacted observing effects on lipid profile and blood pressure, especially given weight changes.
- Variability in pre-study diets, unaccounted for, could have influenced results.
- The study's secondary nature and numerous endpoints raise the possibility of statistical error in observing systolic blood pressure effects. [5]

Study No. 02

All subjects underwent a 2-week “run-in period” that included 3 screening visits to ensure that all subjects demonstrated stable BP within the appropriate range. The study included two dietary conditions: "High Dairy" involved adding four daily servings of non-fat dairy to participants' regular dairy intake, and "No Dairy" replaced all dairy with four daily servings of fruit products. In the High Dairy condition, daily intake of dairy increased significantly, while it decreased in the No Dairy condition. High Dairy resulted in reduced brachial systolic BP, pulse pressure, ankle pulse pressure, increased cardiovagal baroreflex sensitivity (BRS), and improved central systolic BP and pulse pressure. Flow-mediated dilation (FMD) increased in High Dairy and decreased in No Dairy, showing correlations with vascular function changes. Central pulse wave velocity (cfPWV) reduction correlated with changes in systolic BP.

Adding conventional non-fat dairy products to the regular diet led to decreased central systolic BP and pulse pressure in middle-aged and older adults with elevated BP. These reductions were linked to changes in cfPWV and cardiovagal baroreflex sensitivity, along with improved endothelial function as indicated by flow-mediated dilation. Removing all dairy products from the diet resulted in increased central pulse pressure and decreased endothelial function. This suggests that modifying dairy intake, especially non-fat products, can influence central blood pressure and vascular function in this population

Limitations of the study:

- Specific non-fat dairy product effectiveness in reducing BP and improving vascular function couldn't be determined.
- Uncertainty about the dairy product components responsible for the observed effects.
- Lack of clarity regarding the increase in blood pressure associated with fruit products.
- Suggestion for future research to investigate urinary markers and explore the interplay between dairy products, blood pressure, and arterial stiffness. [6]

Study No. 03

Results show that incorporating whole milk and full-fat dairy products into a regular diet does not lead to improvements in subclinical vascular functions linked to elevated BP. Measures of vascular stiffness, endothelium-dependent vasodilation, and cardiovagal baroreflex sensitivity remained unaffected by the dietary intervention. In essence, the consumption of whole milk and full-fat dairy products did not enhance vascular function in individuals with elevated BP. Furthermore, there were no adverse effects observed in consuming full-fat dairy, while the lack of significant differences in vascular functions due to whole milk and full-fat dairy intake might be viewed as a negative finding, it could also be seen positively amid concerns about dairy fats and cardiovascular risk.

Comparative discussion

Out of the selected studies for the term paper, there were three (3) research papers related to health effects on cardiovascular system and lipid profile by milk and milk products. All three studies focused on vascular functions, lipid profiles (fasting of 12 hours) and blood pressure but two articles mainly focused on the changing of blood pressure while the remaining one (study no.3) aims to evaluate the already elevated blood pressure. Two studies were conducted as crossover studies (study no. 2 and 3) which include a minimum of two weeks of washed-out period. All three studies were conducted in the adult population and vulnerable specific groups such as pregnant and lactating mothers as well as pediatrics were excluded. Only in study no 2 was considered premenopausal women (measurements were taken during the early follicular phase of the menstrual cycle) and individuals currently undergoing antihypertensive drugs (five subjects; dosages and routines were maintained throughout the study.

In study no. 3, dairy intake decreased during the no dairy phase and increased during the high dairy condition but in other two there was not. All the 3 studies proved that dairy products do not negatively impact key vascular functions associated with cardiovascular disease development. This understanding is valuable for future research exploring the potential of long-term studies on full-fat dairy products for other therapeutic purposes. But it is important to consider moderation and choose dairy options that align with recommended dietary guidelines to promote cardiovascular well-being. Also, findings given the questioning of recommendations to replace whole milk with reduced-fat milk, understanding how individual dairy components interact and affect cardiovascular risk through subclinical vascular functions holds clinical relevance. [7]

2. Health effects on GIT and gut microbiome and effects on mental health

The gut microbiota is being explored as a target for biotherapies to address conditions like constipation and depression. Probiotics effectively regulate gut health and relieve gastrointestinal issues. Inflammation-related cytokines such as proinflammatory cytokines IL-1β, IL-6, and TNF-α are linked to depression and influenced by gut health. Inadequate sleep has metabolic and behavioral implications, with lifestyle and stress playing vital roles in sleep quality. Stress disrupts the sleep cycle and increases cortisol release, potentially leading to a cycle of poor sleep and heightened stress levels.

Study No. 04

The study examined sleep quality using the PSQI questionnaire and a sleep tracker, along with the DASS-42 questionnaire for mental health. Participants' body measurements were taken, and gut microbiome was analyzed from fecal samples. The effects of Dair- based Products (DP) on sleep quality were assessed, with generally similar PSQI scores between DP and placebo. However, in the modPP group, DP resulted in improved sleep quality, indicated by lower PSQI scores at all time points. No significant changes were observed for the placebo group

The study focused on the effects of a DP on sleep quality and stress in adults. DASS-42 scores showed varied distributions, with no significant differences between DP and placebo groups, except for an anxiety sub-score carryover effect in the ITT population. Baseline DASS-42 scores indicated mild to moderate impact. Placebo improved stress sub-scores and total scores, while DP showed trends towards improvement in total scores and depression sub-scores, especially in the first period. Fecal samples revealed increased Bifidobacterium in DP group associated with improved sleep. DP intake improved sleep quality after 14 days compared to placebo and lower cortisol levels. The study suggests DP might help with moderate sleep issues in adults, primarily after 14 days, but further research is needed for confirmation. [8]

Study No. 05

Daily consumption of *Lacticaseibacillus paracasei* strain Shirot (LcS) for 9 weeks led to notable improvements in constipation and depressive symptoms among depression patients. The intervention also positively impacted gut microbiota by increasing beneficial bacteria like *Adlercreutzia, Megasphaera*, and *Veillonella*, while decreasing bacteria linked to mental health issues such as *Rikenellaceae_RC9_gut_group*, *Sutterella,* and *Oscillibacter*.

In this study, found that LcS alleviated constipation symptoms, especially stool-related issues evaluated with PAC-SYM. LcS also led to significant reductions in BDI and HAMD scores, although changes in depressive symptoms were not significantly different between groups. Moreover, LcS lowered IL-6 levels and regulated the gut microbiota linked to mental health. Lacked metabolite analysis of intestinal microbiota, leaving the exact LcS mechanism unclear was a limitation. [9]

Comparative discussion

In study no. 4 more focused on mental health disorders such as stress, depression, anxiety and their relationship with sleep and gut microbiome were discussed while in study no. 5 only depression was discussed according to findings with more specifically related to LcS. Both studies concluded that evidence were suggesting the improvement of healthy gut microbiome and constipation symptoms in mentally ill-health individuals. Study no.5 can be considered as the first probiotic double-blind RCT to assess constipation symptoms in depression patients.

3. Health effects on Musculoskeletal system, inflammation and physical activities

The decline in physical fitness with advanced aging, often attributed to muscle atrophy (sarcopenia) and reduced bone mineral density (BMD) is linked to chronic inflammation and age-related diseases such as osteoporosis, cancer etc. Exercise training and nutritional

supplementation are suggested strategies to counter this decline in middle-aged and older individuals (most vulnerable group was females due to the estrogen decline with menopause). Despite these recommendations, universally effective regimens remain elusive.

Study No. 06

The study conducted nutrient analyses excluding trial drinks and found no differences in dietary intakes between conditions. Cytokine concentrations were assessed, showing that IL-6 increased 15 minutes after exercise and returned to baseline at 75 minutes with no condition differences. An interaction was noted for IL-10, which increased at 15 minutes and decreased from 24 to 48 hours in the MILK condition, while in the CHO condition, IL-10 increased from 24 to 48 hours. No significant effects were observed for TNF-α and IL-1β concentrations. Percent change analysis revealed greater relative decreases in IL-1β and IL-10 from pre-exercise to 48 hours following MILK compared to CHO, while relative concentrations of IL-6 and TNF-α did not significantly differ between conditions.

At the end, the study showed no significant effects on IL-1β or TNF-α levels. However, 48 hours after exercise, the MILK group had lower relative concentrations of IL-1β and IL-10 compared to the CHO group. Post-exercise milk intake didn't affect pro-inflammatory cytokine absolute concentrations, but it did lead to a reduced relative inflammatory response at 48 hours for IL-1β and IL-10 compared to CHO. The study examined the impact of post-exercise milk consumption on cytokine changes after high-intensity exercise in young adult females. While pro-inflammatory cytokines didn't differ, anti-inflammatory cytokine IL-10 showed distinctions, necessitating further investigation, especially in the context of exercise-induced muscle damage recovery. [10]

Study No. 07

This study aimed to compare the effects of two types of supplementations in premenopausal women over 16 weeks. One group received skim milk fortified with calcium, vitamin D, and zinc (HCM), while the other group received the same milk with added phylloquinone (HCM plus K_1). The study assessed vitamin K status using serum phylloquinone and GluOC measurements and evaluated bone turnover markers including tOC, PINP, and CTx. Plasma levels of parathyroid hormone (PTH) and insulin-like growth factor-1 (IGF-1) were also measured as part of the investigation. Blood sampling, anthropometric measurements and dietary assessment regarding Calcium intake (by 24-hour dietary recall and FFQ) were obtained in standard ways.

The baseline characteristics of participants, including calcium intake, were similar across groups. Vitamin K supplementation resulted in higher serum phylloquinone and lower GluOC levels. Bone markers indicated decreasing tOC concentrations, particularly in the HCM plus K1 group. PINP levels decreased after milk supplementation, and CTx levels dropped significantly within 2 weeks. Measures of 25(OH)D3, PTH, and IGF-1 showed no significant treatment effects. Both milk products contained calcium and 25(OH)D3, with extra phylloquinone in one. Both formulas reduced markers of bone resorption and formation, suggesting calcium's benefits. The roles of additional fortificants like zinc and magnesium are unclear, but vitamin K1 inclusion had an additional effect.

In conclusion, in this short-term trial, fortified milk supplementation in premenopausal women led to a significant reduction in bone turnover. The addition of phylloquinone

improved vitamin K status but didn't show an extra effect on bone turnover in the study's duration. Overall, the trial suggests that both fortified milk products effectively lower bone turnover in young premenopausal women, and the vitamin K-enriched formula improves vitamin K status and decreases specific bone turnover markers. The potential long-term benefits of this reduction on peak bone mass and fracture risk need further exploration. [11]

Study No. 08

Participants were divided into three groups: Intensive Resistance Training (IWT) alone (CNT), IWT + low-dose milk product intake (LD), and IWT + high-dose milk product intake (HD). Despite no initial physical differences, all groups completed 5 months of IWT, with focus on thigh muscle strength and DNA methylation analysis of NFKB1 and NFKB2 genes. Post-exercise milk product consumption led to increased gene methylation proportionate to enhanced muscle strength, suggesting a potential link between aging-related muscle atrophy and pro-inflammatory gene activation. Incorporating milk products during resistance training could counter this effect. Adherence to the 5-month IWT program was strong across groups, with compliance rates for post-exercise milk product consumption in the LD and HD groups at 99.8% and 99.3% respectively. Despite varying milk intake, no significant differences were observed in various parameters. Pre- and post-training characteristics, weight, BMI, fitness metrics, blood glucose, lipid levels, and immune cell compositions were similar among groups.

Can conclude that in physically active older women, consuming a high dose of milk products after exercise resulted in greater increases in thigh muscle strength and methylation of NFKB1 and NFKB2 genes during home-based intensive resistance training (IWT). Women with a history of habitual training experienced enhanced methylation of pro-inflammatory cytokine-related genes following regular IWT, leading to improved thigh muscle strength. These effects were further magnified by post-exercise milk product supplementation. [12]

Comparative discussion

Biochemical markers are commonly used in short-term studies to assess bone turnover and the effects of treatments on bone metabolism before changes in bone density occur. There's limited research on how milk supplementation impacts these markers in premenopausal women, and none have investigated the effect of adding extra vitamin K to the milk supplement. There were three (3) research works included in this term paper related to the musculoskeletal system, inflammation and physical activities, out of which two were related to muscular strength, DNA methylation and systemic inflammation while the other one was associated with bone turnover. The specialty of these studies was all of them were conducted targeting women. Ultimately the common findings imply that consuming milk products after exercise can help mitigate chronic and systemic inflammation, consequently protecting against lifestyle-related diseases while simultaneously enhancing muscle strength.

Biochemical markers are valuable tools in short-term studies for evaluating bone turnover and treatment effects on bone metabolism before density changes occur. Research on milk supplementation's impact on these markers in premenopausal women is limited, with no exploration of additional vitamin K in milk. Only one out of three articles considered this aspect. Future studies should delve into broader aspects of the inflammatory response, encompassing systemic and intracellular cytokines, immune cells, and tissue cell signaling. Furthermore, comparisons between whole foods and their primary anti-inflammatory

constituents are warranted. Future research should investigate other aspects of the inflammatory response, including systemic and intracellular cytokines, immune cells, and tissue cell signaling, while also comparing whole foods to their primary anti-inflammatory components.

4. Health effects on respiratory system and allergies

Study No. 09

The notion that milk consumption leads to increased mucus production and worsens asthma symptoms, historically held, was not substantiated by research in adults. To examine the impact of cow's milk and soymilk challenges on respiratory symptoms, this study focused on asthmatic and non-asthmatic children. While concerns over eliminating milk persist, it's important to note that such action might heighten the risk of milk allergies and hinder essential calcium intake. The study encompassed various groups of children, including those with well-controlled and poorly-controlled asthma. Cow's milk and soy substitute challenges did not yield significant clinical changes in either group. Baseline lung function parameters and FeNO levels varied among asthmatic children. Parental perceptions about milk's respiratory impact did not influence outcomes. The study concluded that cow's milk challenge did not induce acute bronchoconstriction or inflammation in asthmatic and non-asthmatic children. This holds relevance as dairy avoidance is prevalent among asthmatic children, despite limited evidence of its necessity, while other justifications for dairy avoidance exist. The study's limitations included single exposure consideration, potential missed delayed reactions, short dairy elimination periods, possible impact on baseline measures due to extended elimination, lack of inquiry about past milk allergies, small subgroup based on parental beliefs, and potential result generalizability limitations. Addressing these constraints could augment the study's comprehensiveness and accuracy in drawing definitive conclusions about cow's milk exposure's effects on respiratory parameters.

In conclusion, non-asthmatic and asthmatic children reveals that a single cow's milk exposure doesn't lead to respiratory symptoms or issues. This challenges the belief that removing dairy from children's diets prevents respiratory problems. The study found no link between milk intake and respiratory functions in adults too. Even among children whose parents believed milk caused respiratory symptoms, no connection was found between cow's milk exposure and such symptoms. The study aims to guide clinicians by providing evidence against cutting out dairy from children's diets to prevent respiratory issues, emphasizing the potential benefits of cow's milk consumption during early life. [13]

5. Health effects on Immune System in communicable diseases

Study No. 10

This clinical trial investigates the role of Ayurcov, an Ayurvedic formulation, as an adjunct treatment for COVID-19. Designed as a single-center, randomized controlled trial (RCT), the study explores the efficacy and safety of Ayurcov in reducing COVID-19 symptoms across mild, moderate, and severe cases. Ayurcov’s formulation combines traditional Ayurvedic ingredients: *Curcuma longa* (turmeric), Bos Indicus distilled urine and milk, ghee, alum, and rock candy- each chosen for their purported immune-boosting, anti-inflammatory, antiviral, and detoxifying properties.

The trial enrolled 120 participants, randomly assigned to either the Ayurcov group (interventional) or the standard treatment group (control), with blinded assessors recording symptom improvement, hospitalization duration, and adverse effects. Key findings indicate that the Ayurcov group experienced faster resolution of symptoms in mild-to-moderate cases and lower rRT-PCR Ct values, suggesting reduced viral load. In severe cases, however, Ayurcov did not significantly alter recovery times, hospital stay, or ICU admissions. A noted limitation is the uniform dosage of Ayurcov for all severity levels, which may have been insufficient for severe cases. Furthermore, the study does not measure inflammatory markers (e.g., interleukins), crucial for understanding the anti-inflammatory effects of Ayurcov in cytokine storms. While promising, these findings have limited generalizability due to the single-center design and lack of inflammatory biomarker tracking. Future trials could address these limitations by expanding the sample size, adjusting doses based on disease severity, and including biochemical markers to more precisely gauge anti-inflammatory effects. Moreover, while the study references complementary roles of Ayurvedic and allopathic treatments, the influence of standard care on observed outcomes remains unquantified, making it difficult to attribute effects solely to Ayurcov.

Ayurveda aspects of milk in relation to the study

Ayurveda considers milk *(Ksheera),* particularly from cows *(Godugdha),* as a vital component with a range of health-enhancing properties. Milk, with its *Madhura* (sweet) *Rasa*, *Snigdha* (unctuous) quality, and *Sheeta* (cold) potency, nourishes the *Dhatu* and enhances *Ojas* the essence of immunity and vitality. Bos Indicus (Indian cow) milk, included in Ayurcov, is especially valued in Ayurveda for its *Sattvika* (pure) properties, supporting mental clarity, immunity, and digestion. Ayurvedic texts suggest that milk can act as a medium *(Anupana)* for delivering therapeutic agents into the deeper tissues of the body, making it an ideal carrier for herbs with rejuvenating and detoxifying properties.

In the context of Ayurcov, cow milk likely aids the delivery of active compounds into the *Dhatu*, supporting both immunity *(Balya)* and digestion *(Agnivardhaka)* during COVID-19 management. When combined with ghee, another ingredient in Ayurcov, milk is believed to enhance resilience to stress and infection. Ghee's ability to support cellular health, particularly during inflammatory responses, aligns with modern studies highlighting ghee's role in modulating immune responses. Additionally, Ayurvedic principles suggest milk's specific combination with ingredients like turmeric *(Haridra)* enhances the body's tolerance to inflammation, improves immune resilience, and helps control *Kapha* and *Pitta* doshas associated with respiratory and inflammatory conditions.

As a conclusion, in the study, Bos Indicus milk serves not only as an immune-enhancing component but also as a therapeutic base supporting the actions of adjunctive herbs in managing COVID-19 symptoms. Ayurveda emphasizes tailored treatment based on individual *Dosha* and disease states, suggesting that milk-based interventions like Ayurcov can provide benefits in managing both symptomatic and immune-related aspects of illness. As the study aligns with holistic approach of Ayurveda, it paves the way for further research integrating milk's therapeutic role and other Ayurvedic ingredients in contemporary clinical applications for viral infections and immune regulation. [14]

Table 1 shows the summarized information about selected research articles.

Table 1. Summary of the basic information of selected ten articles

	Research	**Type of the study**	**Sample**
1	Impact of low-fat and full-fat dairy foods on fasting lipid profile and blood pressure: exploratory endpoints of a randomized controlled trial	Parallel design RCT	n=72 18-75 years adults weight stable with Metabolic Syndrome Limited, low-fat and Full-fat dairy diet (each n=24)
2	Effects of non-fat dairy products added to the routine diet on vascular function: A randomized controlled crossover trial	randomized controlled crossover study	n=49 adults with elevated blood pressure (44% men, 53±2 years; range 30-76 years and 134±1/81±1 mm Hg)
3	Effects of full-fat dairy products on subclinical vascular function in adults with elevated blood pressure: a randomized clinical trial	randomized controlled crossover intervention	N=60 (age ± SEM; 58 ± 2 years) with elevated BP (systolic/diastolic; 120–159/ < 99 mmHg)
4	The Effect of A Whey-Protein and Galacto-Oligosaccharides Based Product on Parameters of Sleep Quality, Stress, and Gut Microbiota in Apparently Healthy Adults with Moderate Sleep Disturbances: A Randomized Controlled Cross-Over Study	explorative double-blind randomized placebo-controlled cross-over study	n=70 apparently healthy Dutch adults with sleep problems age 30–50 y, BMI 19.5–25 kg/m^2, PSQI ≥ 9 washout period of 3 weeks included after 3 weeks of study
5	Effects of Fermented Milk Containing *Lacticasei bacillus paracasei* Strain Shirota on Constipation in Patients with Depression: A Randomized, Double-Blind, Placebo - Controlled Trial	two-arm parallel design, randomized, double-blind placebo controlled trial (RCT)	n= 82 according to inclusion criteria; 69 subjects completed the study Have two study groups viz. placebo group (n=31) and LcS group (n=38)
6	The Acute Effects of Milk Consumption on Systemic Inflammation after Combined Resistance and Plyometric Exercise in Young Adult Females	randomized crossover design	n=13 healthy females (age: 20.3 _ 2.3 y; body mass index [BMI]: 21.0 ±1.1 kg/m2)
7	Effect of calcium-fortified milk supplementation with or without vitamin K on biochemical markers of bone turnover in premenopausal women	Randomized controlled trial	n=82 20 to 35 y of age with a BMI between 20 and 30 kg/m2

			03 groups; received no supplementation (*n* =26) received two sachets (50 g) of powdered HCM (*n* =29) received two sachets (50g) of HCM plus K1 (*n* =27) per day for 16 weeks
8	Effects of milk product intake on thigh muscle strength and *NFKB* gene methylation during home-based interval walking training in older women: A randomized, controlled pilot study	randomized controlled	n=37 Age 66±5 years (55-75 years of age) performing IWT for > 6 months 3 groups: IWT alone (CNT, n = 12), IWT + low-dose post-exercise milk product intake (LD, n = 12; 4 g protein and 3 g carbohydrate) or IWT + a 3-times higher dose of milk product intake than the LD group (HD, n = 13).
9	Respiratory effects of acute milk consumption among asthmatic and nonasthmatic children: a randomized controlled study	prospective randomized, double-blind, placebo-controlled, parallel-group trial	n=98 Asthmatic (47) and non-asthmatic (51) 6-to 18-year-old children. Final sample size was n=88
10	A randomized, controlled, blinded, parallel group, clinical trial to study the role of Ayurcov (AyurCoro3), one day regimen as an adjuvant therapy for COVID-19 disease management, at dedicated Covid Hospital (DCH) in India	Randomized controlled, blinded, parallel group clinical trial	n=120 mild to moderate group (90) again, divided into control and interventional arms (45 each) severe group (30) again, divided into control and interventional arms (15 each)

Milk is a generic term which include many varieties, products and brands. There are major differences of the properties of the dairy products that have been integral to human nutrition, offering diverse benefits yet requiring critical examination. Ayurveda recognizes milk is beneficial for balancing *Dosha* and promoting vitality. The traditional classification of *Ashta Ksheera* highlights the unique properties of milk types, with cow and goat milk being commonly utilized. Contemporary studies often fail to specify whether fresh, liquid, or

powdered milk was examined, despite significant differences in nutritional profiles. Research indicates multifaceted health effects, influencing cardiovascular health, musculoskeletal integrity, gut microbiome, and immune responses of the milk in generalized way . Low-fat dairy products may improve lipid profiles and blood pressure, while probiotics in fermented milk enhance gut health and mental well-being. Post-exercise milk consumption demonstrates potential in reducing inflammation and improving recovery. However, conflicting findings exist regarding its impact on respiratory conditions and allergies, necessitating personalized dietary considerations.

CONCLUSION AND RECOMMENDATIONS

In conclusion, the existing body of research on the health effects of milk and milk products remains in a state of ongoing investigation. Despite the abundance of literature and prevalent colloquial beliefs, many findings in this domain have proven to be controversial or potentially misleading to the general public. Thus, it is imperative to underscore the necessity for future comprehensive animal and clinical trials. These well-designed studies hold the potential to provide a clearer and more accurate understanding of the true impact of milk and milk products on human health. Through rigorous scientific exploration, we can dispel misconceptions, resolve controversies, and establish evidence-based recommendations, ultimately contributing to the enhancement of public health knowledge in this important area.

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