

Original Research Article

Association of diabetes and hypertension with elderly skin changes

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ABSTRACT

Background: The skin is the largest organ of the human body that fulfils multiple essential tasks. It forms the boundary between the inside and outside. It provides protection against mechanical and chemical threats, it provides innate and adaptive immune defences, it enables thermoregulation and vitamin D production, and it acts as the sensory organ of touch. Aging population is susceptible to many cutaneous and systemic diseases, simultaneously leading to impairment of quality of life in them.

Methods: A cross sectional study was carried on patients above 60 years of age who visited the dermatology OPD at rural tertiary care centre from November 2016 to May 2017.

Results: Total 540 geriatric patients with dermatosis were registered under the study, of these 203 patients had one or more systemic diseases. Hypertension (70.9%) was the commonest disease, followed by diabetes (32.5%).

Conclusions: Skin diseases cause considerable morbidity in elderly, particularly if associated with other comorbid conditions, so health promotion and education can do much to reduce the risk.

Keywords: Elderly, Hypertension, Diabetics

INTRODUCTION

Skin is the largest organ of the human body which completes various essential tasks. It forms the border between the inside and outside. It provides protection against mechanical and chemical threats, it provides innate and adaptive immune defenses, it enables thermoregulation and vitamin D production, and it acts as the sensory organ of touch.¹

Like every other complex biological system, the skin grows, matures, and ages throughout the life course. Skin aging is associated with increases the susceptibility to cutaneous problems and the subsequent development of dermatosis and skin cancers. As well as changes in cutaneous structure and function, its appearance is the

key observable marker of the overall aging process. Thus, our physical appearance in advanced age is important for emotional, mental, and psychosocial well-being.²

Ageing, continuous, and irreversible process also affect skin like other organs. Government of India has been adopted the "national policy on older persons" in the month of January, 1999. The policy defines "senior citizen" or "elderly" as a person who is of 60 years of age or above. The elderly population has increased tremendously in the past few decades all over the world. The number of people aged 65 or older is projected to grow from an estimated 524 million in 2010 to nearly 1.5 billion in 2050, out of which mostly increases in developing countries. The 2011, United Nations population division published reports that "the share of India's population ages 60 and older is projected to climb

from 8 percent in 2010 to 19 percent in 2050. About 75% of persons of age 60 and above reside in rural areas.³ Enhanced survival into old age is the result of changes in the socioeconomical development within societies and will inevitably affect the pattern of disease.

In geriatric patients, chronic diseases such as hypertension (HT), diabetes mellitus (DM), thyroid disorders etc., are commonly seen, at the same time geriatric skin is more prone to skin diseases. ICMR study of 1984–1985 showed that 13.3% of skin problems were seen in elderly persons over 60 years of age.⁴

DM is a syndrome which consists of multiple diseases and considered a modern epidemic disease that affects about 8.3% of adults, which accounts for 382 million people of the world population, and 46% of cases are estimated to be currently undiagnosed. Enhancement of urbanization with dietary changes, reduced physical activity of man, and changes in other lifestyle patterns, in addition to the increasing rates of obesity contributes to the greater prevalence of diabetes mellitus.⁵

METHODS

Study design: Observational cross-sectional study

Study area and study unit: The study was carried out in the OPD of department of dermatology, venereology and leprosy, Era’s Lucknow medical college and hospital, Lucknow with the broad aim of assessing the prevalence of cutaneous manifestations in elderly patients aged 60 years and above.

Lucknow district and the adjoining areas have a mixed population, with varying levels of socio-economic conditions, religious customs, living habits and habitat which are bound to have a wide spectrum of significant influence on skin disorders among elderly group.

Period of study: 18 months from November 2016 to May 2017.

Ethical clearance: Prior to commencing the data collection for the research, the study protocol was cleared for ethics by research institutional review board of Era’s Lucknow medical college and hospital, Lucknow.

Sample size: Sample size for this research was calculated on the basis of proportion of most common skin condition Seborrhoeic Keratosis using the formula:⁶

$$n = \frac{Z\alpha^2 pq}{L^2}$$

Where, p= 56%, the proportion of seborrhoeic keratosis

q=100-p

Type 1 error $\alpha=5\%$

Allowable error L=7.5% of p for detecting results with 90% power of study

The sample size comes out to be n=540.

Minimum sample size: Based on the above estimation model, my sample size comes out to be 540 patients with skin disorder and aged 60 or more years.

Inclusion criteria

All patients of both sexes, aged 60 years and above and attending the outpatient department of dermatology, venereology and leprosy, Era’s Lucknow medical college and hospital, Lucknow. And patients were predominantly from in and around Lucknow district were included in the current study.

Exclusion criteria

Patients with age less than 60 years and patients from other than Lucknow area were excluded from the study.

The individuals were explained the purpose and significance of the study. Also, participating individuals were assured that information given by them would be kept confidential. The consenting and participating individual’s names and addresses were recorded after obtaining informed consent. Individuals were interviewed in privacy and desired information was collected on a pre-designed schedule through oral questionnaire method. Finally 540 consenting individuals were investigated in total.

Information on characteristics like name, age, sex, occupation, chief complaints, past history, treatment and drug history, family history, history of any allergy and personal history were carefully collected and recorded. Complete dermatological examination was carried out, including the skin all over the body, hair, oral and genital mucosa.

Routine investigations like Hb, TLC, DLC, blood sugar levels, urine (R/M), blood pressure were also had been done.

Dermatological procedures like: patch test, skin biopsy, pus for culture and sensitivity (when and where required).

Table 1: Criteria for diagnosis of hypertension.⁷

BP category	SBP (mmHg)	DBP (mmHg)
Normal	<120	And <80
	120-129	And <80
Hypertension		
Stage 1	130-139	Or 80-89
Stage 2	>=140	Or >=90

Criteria for the diagnosis of diabetes:⁸ FPG \geq 126 mg/dl (7.0 mmol/l). Fasting is defined as no caloric intake for at least 8 hours. OR

2 hours PG \geq 200 mg/dl (11.1 mmol/l) during OGTT. The test should be performed as described by the WHO, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water. Or

HbA1C \geq 6.5% (48 mmol/mol). The test should be performed in a laboratory using a method that is NGSP certified and standardized to the DCCT assay. Or

In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose \geq 200 mg/dl (11.1 mmol/l).

Statistical analysis: Data entry was made in Microsoft Office Excel software, while the statistical analysis was executed in SPSS software® ver. 18. Descriptive statistical analysis, which included frequency, percentages, mean, standard deviation, Range and median, was used to characterize the data and report the diversity of the sample employed in this research. Association with the factors was tested for significance using Chi-square test and p $<$ 0.05 was considered statistically significant. Unpaired t-test and ANOVA (Analysis of variance) was used to compare no. of diseases between/among age groups, gender and other

variables. Bar graphs, pie charts and error bars were made to visually summarize the data and findings.

RESULTS

On looking the systemic diseases in elderly people with dermatosis, out of 301 males it was found that 138 male have systemic disease, and out of 239 females it was found that 120 female have systemic illness (Table 2).

Table 2: Shows systemic disease in elderly patients with dermatosis (n=540).

Patients	Total	Systemic disease	P value
Male	301	138	0.001
Female	239	120	0.001
Total	540	258	0.001

Hypertension was the commonest associated disease seen in 35.7% cases followed by diabetes mellitus in 27.2% cases (Table 3).

Table 3: Distribution of associated diseases among the subjects (n=540).

Associated Diseases	No.	%
Hypertension	193	35.7
Diabetes Mellitus	147	27.2

Table 4: Association of physiological changes with associated diseases.

Physiological Change	Associated Disease	Hypertension		Diabetes Mellitus		
		No.	%	No.	%	
Xerosis	Absent	238	74	31.1	41	17.2
	Present	302	119	39.4	106	35.1
Chi square			4.004			21.46
P-value			0.045			<0.001
IGH	Absent	407	158	38.8	110	27.0
	Present	133	35	26.3	37	27.8
Chi square			6.825			0.032
P-value			0.009			0.859
Wrinkling	Absent	103	19	18.4	49	47.6
	Present	437	174	39.8	98	22.4
Chi square			16.575			26.606
P-value			<.001			<0.001
Senile lentiginos	Absent	451	158	35.0	107	23.7
	Present	89	35	39.3	40	44.9
Chi square			0.596			16.892
P-value			0.44			<0.001
Senile comedones	Absent	483	171	35.4	138	28.6
	Present	57	22	38.6	9	15.8
Chi square			0.226			4.204
P-value			0.634			0.040

On looking the association between Physiological change type with associated diseases, it was found that hypertension and diabetes mellitus are significantly associated with the xerosis and wrinkling ($p < 0.05$) while IGH is significantly associated with Hypertension and senile comedones is significantly associated with diabetes ($p = 0.040$) (Table 4).

On looking the association between Pathological conditions with associated diseases, it was found that diabetes mellitus is significantly associated with the benign conditions, infestations and psychocutaneous disorders ($p < 0.05$) while hypertension is significantly associated with infestations, papulosquamous disorder, psychocutaneous disorder and eczematous conditions (Table 5).

Table 5: Association of pathological change with associated diseases.

Pathological change	Associated disease	Hypertension		Diabetes mellitus		
		No.	%	No.	%	
Benign conditions	Absent	296	112	37.8	105	35.5
	Present	244	81	33.2	42	17.2
Chi square		1.254		22.509		
P-value		0.263		<0.001		
Infestations	Absent	449	176	39.2	114	25.4
	Present	91	17	18.7	33	36.3
Chi square		13.868		4.516		
P-value		<0.001		0.034		
Papulosquamous disorder	Absent	478	158	33.1	136	28.5
	Present	62	35	56.5	11	17.7
Chi square		13.081		3.177		
P-value		<0.001		0.075		
Bullous disorder	Absent	526	189	35.9	146	27.8
	Present	14	4	28.6	1	7.1
Chi square		0.322		2.925		
P-value		0.571		0.087		
Psychocutaneous disorders	Absent	513	189	36.8	134	26.1
	Present	27	4	14.8	13	48.1
Chi square		5.419		6.282		
P-value		0.02		0.012		
Miscellaneous disorders	Absent	502	188	37.5	130	25.9
	Present	38	5	13.2	17	44.7
Chi square		9.077		6.329		
P-value		0.003		0.012		
Eczematous conditions	Absent	422	92	21.8	107	25.4
	Present	118	101	85.6	40	33.9
Chi square		163.395		3.397		
P-value		<0.001		0.065		

DISCUSSION

Skin changes in the elderly occur either due to natural aging process, or due to pathological dermatological conditions. Compared to general population, the pattern of cutaneous changes seen in elderly population may be different or unique.

Ageing is a complex process that is due to accumulation of molecular damage overtime.⁹ Both intrinsic ageing (genetic, chronological ageing) and extrinsic ageing (environmental, photoageing) contribute to cutaneous ageing.¹⁰ Ageing skin has susceptibility to dermatologic disorders due to the structural and physiological changes

that occur as a consequence of intrinsic and extrinsic ageing.¹¹

WHO reports that the most significant emerging demographic phenomenon in the world would be that it will have older people than children and more people at extreme old age than ever before, with the projected exponential ageing of almost all industrialized societies, a greater commitment should now be directed toward the burgeoning sub-discipline of clinical medicine.³

Many studies focuses on dermatosis in geriatric population.¹²⁻¹⁵ There are studies showing association of dermatosis with specific systemic diseases like diabetes

or cardiovascular conditions in general population, but not specifically in the geriatric age group.¹⁶⁻²²

In our descriptive study, a total of 540 patients varying in age from 60-90 years were examined. Of these, 301 patients (55.7%) were males and 239 (44.3%) were females. Among 258 patients of dermatosis associated with various systemic diseases 138 (53.49%) were males and 120 (46.51%) were females. $P < 0.005$, significant. In addition, by Jiamton et al, out of 516 patients, 217 (47%) were males and 299 (57.9%) were females.²³ In a study by Talukdar and Mitra, out of 360 patients 257 (71.4%) were male patients and 103 (28.6%) were female patients.²⁴ In a study by Raveendra et al in 200 patients, 147 (71%) were males and 58 (29%) were females.⁶ In a study by Jindal et al out of 1380 patients 921 (66.7%) were males and 459 (33.3%) were females.²⁵ In a study by Sheetal and Shashikumar, out of 300 patients, 204 (68%) were males and 96 (32%) were females.²⁶

In a study by Droller on random cases of 476 individuals, out of which, 192 were men and 284 were women, all patients were between 60 and 90 years of age.²⁷ Tindall and Smith studied 163 volunteers, all above 64 years of age, Verbov examined 170 consecutive patients aged between 60 to 90 years in an OPD.^{28,29} Weismann et al studied 494 subjects aged between 55 and 106 years of age.³⁰ Durai et al did a hospital-based descriptive study on 500 elderly, females aged 50 years and above and males aged 60 years and above, in their study, female-to-male ratio was 1.34:1, out of which 213 were males (42.6%) and 287 (57.4%) were females.³¹

In this present study, hypertension and diabetes mellitus were the two associated conditions were included. Hypertension was seen in 35.7% cases while diabetes mellitus in 27.2% cases.

As compared to study by Dhumale, Khyalappa, diabetes mellitus was the common association in 27.5% and hypertension in 15%.³² Beauregard and Gilchrest described 89.7% of patients to have major medical illnesses, of which 88.2% were on medication.³³ Patange, Fernandez observed associated systemic ailments in 30% of cases.³⁴ In addition to a study by Durai et al observed diabetes (28.9%) and hypertension (25.5%) were the commonest associated conditions, which is similar to our study.³¹

In our study association of physiological changes with associated diseases xerosis was 302/540 (55.93%), out of that hypertension was 119 (39.4%) chi square=4.004 and $p=0.045$ and diabetes mellitus 106 (35.1%), chi square=21.46 and $p < 0.001$. IGH was 133/540 (24.63%), out of that hypertension was 35 (26.3%) chi square=6.825 and $p=0.009$ and diabetes mellitus 37 (27.8%), chi square=0.032 and $p=0.859$. Wrinkling was 437/540 (80.93%), out of that hypertension was 174 (39.8%) chi square=16.575 and $p < 0.001$ and diabetes mellitus 98 (22.4%), chi square=26.606 and $p < 0.001$. Senile lentiginos was 89/540 (16.48%), out of that hypertension

was 35 (39.3%) chi square =0.596 and $p=0.44$ and diabetes mellitus 40 (15.8%), chi square=4.204 and $p < 0.001$. Senile comedones was 57/540 (10.56%), out of that hypertension was 22 (38.6%) chi square=0.226 and $p=0.634$ and diabetes mellitus 9 (44.9%), chi square=16.892 and $p=0.040$. Our study shows association of pathological change with associated diseases benign conditions was 244/540 (45.19%), out of that hypertension was 81 (33.2%), chi square=1.254 and $p=0.263$ and diabetes mellitus 42 (17.2%), chi square=22.509 and $p < 0.001$. Infestations was 91/540 (16.85%), out of that hypertension was 17 (18.7%), chi square=331.254 and $p < 0.001$ and diabetes mellitus 33 (36.3%), chi square=4.516 and $p=0.034$. Papulosquamous disorder was 62/540 (11.48%), out of that hypertension was 35 (56.5%), chi square=13.081 and $p < 0.001$ and diabetes mellitus 11 (17.7%), chi square=3.177 and $p=0.075$. Bullous disorder was 14/540 (2.59%), out of that hypertension was 4 (28.6%), chi square=0.322 and $p=0.571$ and diabetes mellitus 1 (7.1%), chi square=2.925 and $p=0.087$. Psychocutaneous disorders was 27/540 (5%), out of that hypertension was 4 (14.8%), chi square=5.419 and $p=0.02$ and diabetes mellitus 13 (48.1%), chi square=6.282 and $p=0.012$. Miscellaneous disorders was 38/540 (7.04%), out of that hypertension was 5 (13.2%), chi square=9.077 and $p=0.003$ and diabetes mellitus 17 (44.7%), chi square=6.329 and $p=0.012$. Eczematous conditions was 118/540 (21.85%), out of that hypertension was 101 (85.6%), chi square=163.395 and $p < 0.001$ and diabetes mellitus 40 (33.9%), chi square=3.397 and $p=0.065$.

CONCLUSION

Skin diseases cause considerable morbidity in elderly, particularly if associated with other comorbid conditions, so health promotion and education can do much to reduce the risk. Further studies in the field are needed to help reduce the burden in elderly population who are at greater risk of disorders with advanced age, general health issues, drug therapy and chronic diseases. As the proportion of the world's population in the older ages continues to increase, the need for more knowledge of this group becomes essential to assist policy makers in their role to define, formulate programs, and also to raise public awareness. In geriatric patients, chronic diseases such as hypertension and diabetes mellitus are commonly seen, at the same time geriatric skin is more prone to skin diseases. Skin diseases cause considerable morbidity in geriatric patients, particularly if associated with other comorbid conditions such as hypertension and diabetes mellitus, so health promotion and education can do much to reduce the risk. Further study is required to help reduce the burden in elderly population who are at greater risk of disorders with advanced age, general health issues, drug therapy and chronic diseases.

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